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DESCRIPTION OF PALEARCTIC SPECIES OF *APANTELES* (HYMEN., BRACONIDAE)

By the late Lieut. D. S. Wilkinson, R.N.V.R.

(*Imperial Institute of Entomology.*)

Manuscript received 12 October, 1944.*

(Read 1 November, 1944.)

With 153 Text-figures.

Introductory Note.

Douglas S. Wilkinson was lost at sea through enemy action in 1941. His ambitious and courageous purpose of producing a monograph of the palearctic species of *Apanteles* remained unachieved. He left his unfinished MS to the Director of the Imperial Institute of Entomology, then Sir G. A. K. Marshall, to whom it was at once apparent that a successor ought to be found to carry on the work so ably begun by Wilkinson. He asked me if I would step into this rôle and I readily accepted, since it seemed to me regrettable that the immense labour and painstaking care that Wilkinson had devoted to his self-imposed task should fail to bear fruit through no lack of steadfastness of purpose but from loyalty to a cause that for him transcended the claims of self-interest.

I foresaw nothing that could obstruct the smooth execution of the work that had been assigned to me. Only after spending a year or so working through the huge mass of material that Wilkinson had accumulated did it become increasingly clear to me that my approach to the problem of handling this undertaking was so different from Wilkinson's that our contributions, if combined, would form a very uneasy union. It was decided, therefore, after consultation with Dr. S. A. Neave, who was now Director of the Institute, and Sir Guy Marshall, that arrangements should be made to publish at once that part of the monograph which had been completed by Wilkinson. It is printed here in the form in which he left it with but a few minor alterations.

Meanwhile my own studies on *Apanteles* continue and their results will eventually be embodied in a piece of work which will have the same scope as was planned for the original monograph. I should like it to be looked upon as a tribute to all those qualities of Wilkinson's which have left so unique a stamp upon his work and as an acknowledgement to his untiring efforts to recover from nomenclatorial chaos the systematics of a difficult group of insects.

To all those who helped Wilkinson with information and material I express my indebtedness; their generous co-operation in the past has made it easier for me to carry on where my late colleague left off. To Mr. R. L. E. Ford, Wilkinson's closest collaborator, especial recognition is due; his wide field experience and unusual skill in reproducing the conditions in which the parasitic *Apanteles* and their hosts develop have enabled him to work out the life-history of nearly all the species described by Wilkinson in the following pages. It is not too much to say that the species selected by Wilkinson for describing were invariably those about the biology of which Ford had previously been able to gather valuable information.

* Printed with the aid of a bequest from the author for the purpose, and with assistance also from Dr. E. McC. Callan and Mr. R. L. E. Ford.

The species the descriptions of which follow fall into the four main groups which Wilkinson regularly used in his work on *Apanteles* and each of which he designated by a letter, namely, F. A. U. and S. The significance of these letters will be familiar to those who have made use of his numerous papers on the genus. The arrangement of the species within each group is my own but it must be accepted as provisional since my knowledge of *Apanteles* is not yet wide enough for me to make positive statements about the interrelationships of the species included in it.

G. E. J. Nixon,
Imperial Institute of Entomology.

Apanteles acuminatus Reinhard.

Apanteles acuminatus Reinhard, 1880, *Deuts. ent. Z.* **24** : 370.
Apanteles cultrator Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 192; 1888, *Spécies Hymen. d'Eur.* **4** : 443 (**syn. n.**).

♀. Black; all legs (save for the coxae, and for certain darkening of the trochanters, trochantines, apical joint of tarsi, claws, and occasionally of apex of hind femora above) red testaceous; palpi to some extent darkened; tibial spurs pale; wings hyaline, and the setae coloured; wing-veins, stigma, and metacarp, brown (or possibly more rightly describable as red-brown); stigma uniformly opaque.

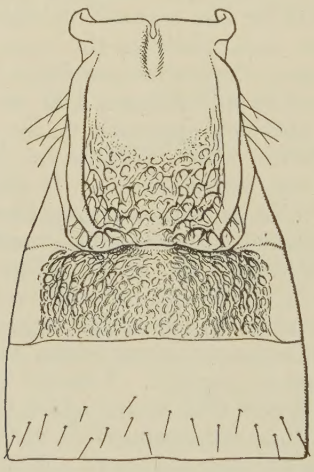

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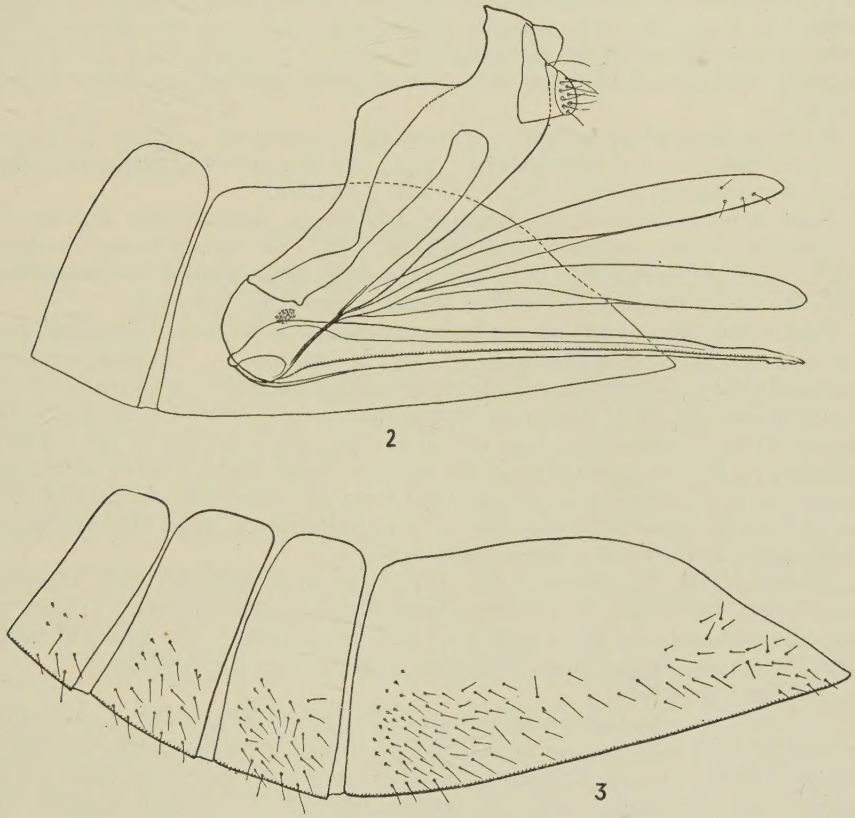
Fig. 1.—*Apanteles acuminatus* Reinhard; basal tergites, ♀.

A series of three females (serial no. 936, see below) have all the legs including the coxae entirely red testaceous (save for darkened claws and extreme basal portions of hind coxae back), and the palpi not darkened.

♂. Black; the four anterior tibae and tarsi, some apical portions of the front femora, about basal three-fifths of hind tibiae more or less, red testaceous; all coxae black; remainder of legs including claws and apical joint of all tarsi, more or less darkened; palpi to some extent darkened; tibial spurs pale; wings hyaline, and the setae coloured; wing-veins, stigma, and metacarp, brown (or possibly more rightly describable as red-brown); stigma uniformly opaque.

♀♂. *Head*: face, clypeus, frons, and vertex, punctate (degree 3), the face even sometimes almost describable as minutely rugose, this possibly being due to some weak, but usually quite distinct, median, longitudinal aciculation that occurs in addition to the punctures; facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli in ♀ nearer, in ♂ rather nearer, to each other than to the eyes; flagellum of ♂ about equal to combined length of head, thorax, and abdomen, of ♀ barely equal to combined length of thorax and abdomen. *Thorax*: mesonotum along the lines of the notauli minutely rugose, elsewhere minutely punctate (degree 3), save down the median longitudinal line where there



FIGS. 2 & 3.—*Apanteles acuminatus* Reinhard: 2, genitalia, ♀; 3, apical ventrites, ♀.

are often stronger (degree 4) punctures and sometimes also a fine carina; scutellar sulcus with about ten crenulations; disc of scutellum throughout punctate (degrees 3 and 4); propodeon with about the median third of the basal two-thirds slightly sunken, throughout with quite strong, irregularly reticulate, quite widely placed carination, too widely placed to permit the descriptive word rugose. *Legs*: hind coxae above and on upper half of outer faces throughout with well-separated, minute punctation (degree 2); hind tibial spurs subequal, the longer spur less than half the length of the basal joint of the hind tarsus. *Abdomen* (fig. 1): 1st tergite in basal half weakly excavate, smooth, and shining, in apical half or two-fifths weakly turned over and down, and rugose; 2nd tergite rugose, with its sulci obsolete or wanting (except perhaps in the basal angles); 3rd tergite entirely smooth, save

in the ♀ for one (or at most one complete), and in the ♂ for at least two complete, transverse rows of minute (degree 1) punctures; succeeding tergites smooth save for the usual minute punctures; ventrites of ♀ without median longitudinal suture; ovipositor sheaths about as long as the hind tibia; hypopygium very large, its apical half acute (45°) (figs. 2 and 3).

Length, 2·5–3·0 mm.

Redescribed from the following material:—British Museum: Marshall Collection, 1 ♀, undated, no locality. Fitch Collection: 1 ♀ (*G.H.R.*). A. C. W. Wagner's Collection: Germany, Neumünster, 5 ♀♀, 1 ♂, ser. no. 39, 1.iv.1902, 2.iv.1902, 3.iv.1902, 4.iv.1902, Wrist, 1 ♀, 1 ♂, ser. no. 21, 6.iv.1919, Innien, 1 ♀, 2 ♂♂, ser. no. 22, 22.iii.1912, 1 ♂, ser. no. 24, 2.v.1912. Zoologisches Museum der Universität, Berlin: 7 ♀♀, 3 ♂♂, 1 ?, 11.v.1891, 14.v.1891 (*Coll. Dr. R. Krieger*), 3 ♀♀, ser. no. 936, undated (neither series with locality).

Further material examined:—Reinhard Collection: Wien, 5 ♀♀, 1 ♂, Stuttgart Museum, 1 ♀ (*type series*). A. C. W. Wagner's Collection: Germany, Neumünster, 2 ♀♀, 2 ♂♂, 1.iv.1902, 2.iv.1902.

Type of *acuminatus* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26927, the variety being numbered 26928. *Type* of *cultrator* in the Fitch Collection, Collection of the Essex Field Club, the Essex Museum of Natural History, Stratford, London.

Host. Reinhard originally described *acuminatus* to have been bred from the Nymphalids *Melitaea phoebe* Knoch, and *M. maturna* L. Marshall originally described *cultrator* simply from "a hairy caterpillar preserved on the same card"; this caterpillar Mr. N. D. Riley has been so good as to identify for me as *Melitaea aurinia* Rott. There is no host record for the single female in the Marshall Collection. All the remainder of the material from which I have redescribed the species is recorded to have been bred from *Melitaea maturna* L., that from Innien bearing in addition this note—"jungen Raupen d. 2mal überwinterten," which seems to me to be a curious observation.

Morley (1906, *Entomologist* **39**: 101) records in addition that Chapman bred eleven specimens, at Locarno, from *Melitaea athalia* Rott. I have not seen this material, but the record may well be accepted: the genus of host is correct, and *acuminatus* is so distinctive with its huge hypopygium.

Cocoons pure white.

Commentary. Reinhard originally described his *acuminatus* from an unstated number of both females and males, and an unnamed variety from apparently a single female. In the Reinhard Collection standing under this name are five females and one male; and one female, labelled "Stuttgart Museum", is standing under the name *acuminatus* var. These specimens are quite obviously to be accepted as the original, or part of the original, series, and they agree in the minutest detail with the more testaceous material from which I have redescribed the species, and with which I myself compared them.

Marshall, in the original description of his *cultrator*, said: "Two specimens, reared by Raynor from a hairy larva preserved on the same card, are in Fitch's collection. The cocoons are four in number." His observation in 1888, however, was not quite the same: at this time he said: "Quatre exemplaires dans la collection de M. Fitch sont sortis d'une chenille poilue non déterminée. Coques blanches." The single female in the Fitch Collection, referred to above, is the only specimen there standing under this name; it is mounted on a card with a "hairy larva" and four cocoons, while scrawled on the underside of the card are Raynor's initials, G.H.R. The pin also bears two labels, "Apanteles

cultrator, n.sp.", and " n.sp. sect. ii ". Since in addition this specimen agrees with the description of *cultrator*, it is clearly one of the two referred to by the author in his original description of the species. On the other hand, the single female in the Marshall Collection is merely labelled " cultrator Marsh " in the usual style of the Marshall Collection, and bears a British Museum type-label, which has been reversed, and which has written on the reverse (now uppermost) side the words " *Not* the type CM " : that is to say, no indication as to the source of this specimen is available. Taking all this into consideration, I am constrained in this instance to agree with Mr. Claude Morley that this latter specimen cannot be considered the type, despite the fact that in my own mind I am convinced that it is the other specimen referred to by Marshall and which, being in his own collection, should preferably be accepted as the type of his species. The specimen in the Fitch Collection must be accepted as the type; and I have so labelled it.

It may perhaps be of value to note that the series from Neumünster is labelled, in addition, " Apanteles n.sp. ?. Konow det."

Apanteles villanus Reinhard.

Apanteles villanus Reinhard, 1880, *Deuts. ent. Z.* **24** : 368. Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 409. Giard, 1893, *Bull. Soc. ent. France* **1893** : 298. Marshall, 1897, *Spécies Hymen. d'Eur.* **5 bis** : 176.
Apanteles fasciatae Gautier & du Dresnay, 1926, *Bull. Soc. ent. France* **1926** : 183 (**syn. n.**).

♀. Black; legs (except as follows), basal ventrites, and considerable portions of the 3rd tergite, red testaceous; all feet, and apical tarsal joint of the four anterior legs, darkened; the four anterior coxae often slightly darkened, sometimes quite strongly so; hind coxae black save for extreme apex; hind femora tipped with black, commonly with the apical half black (except below) or even the apical three-fifths, occasionally entirely black except for extreme base and except (as before) below; hind tibiae darkened broadly at apex and narrowly at base; hind tarsi darkened; palpi and tibial spurs pale; wings infumated evenly throughout, sometimes quite strongly so, the setae of the fore-wings coloured, and of the hind-wings apparently white; wing-veins, stigma, and metacarp, brown, the costal veins testaceous basally; stigma uniformly opaque.

♂. Much darker than ♀; black; the four anterior femora (save for some darkening basally), the four anterior tibiae and tarsi (save for the darkened feet and apical tarsal joint), and the basal ventrites, red testaceous; the four anterior coxae strongly darkened or black, the four anterior trochanters much darkened, and the four anterior trochantines more or less testaceous; the middle femora sometimes quite considerably darkened; the hind femora (save below to some extent, and at extreme base, where they are red testaceous), and the hind coxae entirely, black; hind trochanters strongly and hind trochantines to some extent darkened; hind tibiae black at base and in about apical two-fifths, otherwise more or less red; hind tarsi more or less black; palpi, tibial spurs, and wings, as in ♀.

In a series of females and males [1] more strongly darkened than described above, the ♀ has all coxae, trochanters, and hind femora, quite definitely and entirely black, and the trochantines much darkened, but otherwise agrees well enough with above description of the *male*, while the ♂ is even darker again and has the hind legs black throughout (save for an almost indeterminable patch of red in about the middle of the hind tibiae above), the four anterior femora quite black (except at their apices), and the four anterior tibiae and tarsi with some darkening.

♀♂. *Head* : face throughout regularly punctate (degree 3); facial depressions clearly

[1] Cotypes of *fasciatae* presented to the British Museum and labelled as such, and in the collection of Dr. Ferrière unlabelled.

nearer to apex of clypeus than to the eyes; frons and vertex punctate but neither so strongly (degree 2), regularly, nor closely as the face; frontal orbits punctate (degree 3), commonly so closely punctate as to be more rightly describable as minutely rugose; posterior ocelli about equidistant from each other and the eyes; flagellum of ♀ more usually rather shorter than, but in some few small specimens about equal in length to, the combined length of thorax and abdomen, of ♂ longer than combined length of head, thorax, and abdomen, but not so long as combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum rugose or rugoso-punctate (degree 5), except for about the extreme lateral fifths of the posterior two-thirds and for two patches in the anterior half one on each side of the rugose medial line where the mesonotum is much smoother, much

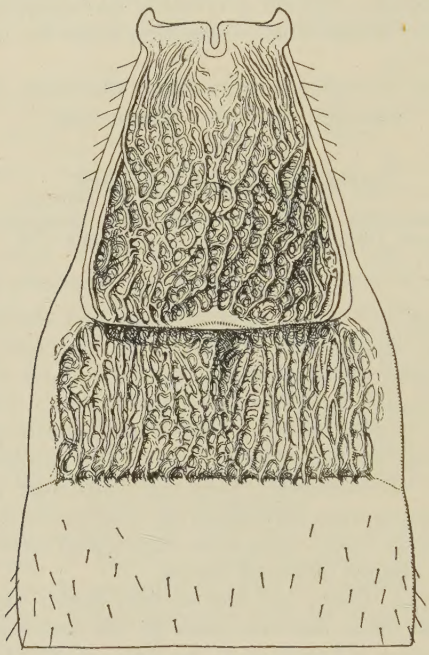
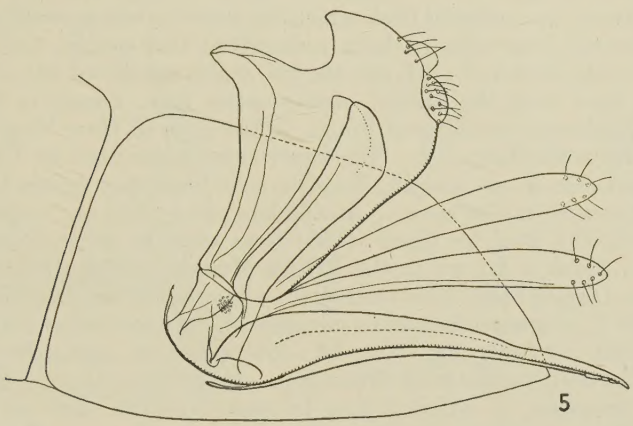


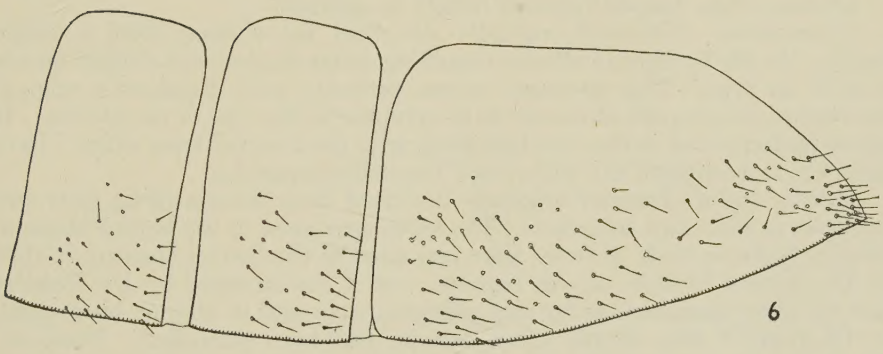
Fig. 4.—*Apanteles villanus* Reinhard; basal tergites, ♀.

more shining, and with much more widely placed more minute (degree 3) and more indefinite punctation; scutellar sulcus strongly crenulate; disc of scutellum throughout strongly punctate (degree 4), or even often rugoso-punctate, particularly both laterally and distally; propodeon strongly, coarsely reticulately rugose. *Wings* of ♀ unusually short, the fore-wing shorter than combined length of thorax and abdomen, often noticeably so. *Legs*: hind coxae rugose; hind tibial spurs equal in length, rather less than half the length of the basal joint of the hind tarsus. *Abdomen* (fig. 4): 1st tergite at base strongly excavated, medianly tumescent, apically strongly turned over, throughout rugose except perhaps for a smooth area at base and except for the apical angles which commonly have longitudinal rugose carinulae; 2nd tergite throughout rugose and with rugose longitudinal carinulae, commonly almost entirely with such carinulae; 3rd tergite, smooth, throughout each lateral fourth with exceedingly minute, widely spaced punctation, and with a single row of such punctures transversely across the apex of about the basal half or three-fifths, this transverse

row however very variable, sometimes strongly in evidence, often obsolete or even entirely wanting; succeeding tergites with the usual minute punctation; ventrites without median longitudinal suture; ovipositor sheaths equal in length to, or perhaps just a little longer than, the basal joint of the hind tarsus; hypopygium large, its apex just slightly acute (figs. 5 and 6).

Length, 2·5–3·0 mm.





FIGS. 5 & 6.—*Apanteles villanus* Reinhard : 5, genitalia, ♀; 6, apical ventrites, ♀.

Redescribed from the following material :—BRITISH MUSEUM : Marshall Collection, France, 1 ♀, 1 ♂; 4 ♀♀, 3 ♂♂, labelled " fasciatae, Gaut. & Dres. Cotype ". CH. FERRIÈRE'S COLLECTION : 2 ♀♀, 1 ♂, labelled " fasciatae, Gaut." ZOOLOGISCHES MUSEUM DER UNIVERSITÄT, BERLIN : Leipzig, 14 ♀♀, 5 ♂♂, 25.iv.1890, 26.iv.1890, 27.iv.1890 (*Dr. R. Krieger*), 4 ♀♀, 5 ♂♂, 4.v.1891 (*Dr. R. Krieger*), 6 ♀♀, 6 ♂♂, 20.iv.1894 (*Dr. R. Krieger*); Berlin, 10 ♀♀, 2 ♂♂, 20.v.1901 (*M. Ude*); 2 ♂♂, ser. no. 121. A. C. W. WAGNER'S COLLECTION : Thüringen, 6 ♀♀, 3.vi.1902, 5.vi.1902, ser. no. 125, Lockst. Lager, 2 ♀♀, 2 ♂♂, v.1931, ser. no. 83.

Further material examined :—REINHARD COLLECTION : 1 ♀ (*type*).

Type of *villanus* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26922. *Type* of *fasciatae* presum-

ably either in Gautier's or du Dresnay's collection; seven cotypes in the British Museum.

Host. The original description of *villanus* is without host record. *A. fasciatae* was originally described as a parasite of the Arctiid, *Arctia fasciata* Esp., which is now placed in the British Museum under *Apantesis*; while the Agrotid, *Dasycampa staudingeri* Grsl., now known as *Conistra ligula* Esp., was also mentioned as a host in the original description of *fasciatae*, but not apparently as the host of the material from which the parasite was actually described.

Of the material from which I have redescribed this species, the two series from Leipzig dated 1890 and 1891, and the two males numbered 121, are labelled to have been bred from the Arctiid, *Arctia aulica* Esp., known in the British Museum as *Hyphoraia testudinaria* Fourc., while both of Herr Wagner's series are recorded from this host also. The twelve specimens bred by Ude are also labelled as parasitic on an Arctiid, *Emydia*, now *Euprepia*, *striata* L., and the two Marshall specimens also have an Arctiid host, since they are unquestionably part of the material bred by Giard (1893) from what he refers to as *Chelonia villica* L., but which is known in the British Museum under *Arctia*. Finally, the series from Leipzig dated 1894 is labelled to have been bred from the Agrotid, *Agrotis fimbria* L., a species known to us under the generic name *Triphaena*.

Picard (1914, *Progress Agr. Vit.* **61** : 264) refers to *Apanteles cajae* and *villanus* as important parasites of *Arctia* spp. He gives a coloured figure in his paper of an *Apanteles*, by which it may be seen, however, that the species he had before him was unquestionably neither *cajae* auctt., nor *villanus* Reinh., nor *compressiventris* Mues., which also parasitises Arctiids.

Cocoons white, heaped together loosely in numbers.

Commentary. Reinhard originally described his *villanus* from a single female. In the Reinhard Collection standing under this name is a single female labelled as type. This specimen agrees perfectly with Reinhard's original description, and is quite obviously to be accepted as the type of the species. It agrees perfectly and in the minutest detail with the material from which I have made the redescription and with which I myself compared it.

Gautier and du Dresnay originally described their *fasciatae* from forty-two examples in their own collection. The seven specimens in the British Museum labelled *fasciatae* Gaut. & Dres., were presented to the British Museum in 1930 by Dr. Gautier himself, on our request; and I am informed by Dr. Ferrière that the three specimens in his own collection were sent to him, on his request, by Dr. Gautier very shortly after *fasciatae* had been published. These ten specimens, therefore, are almost unquestionably cotypes; and I have so labelled them. They agree perfectly and in the minutest detail with all the other material from which I have made the redescription, save only that they are rather darker, as I have noted and described; and they are quite obviously referable to *villanus* despite Gautier and du Dresnay's statement to the contrary.

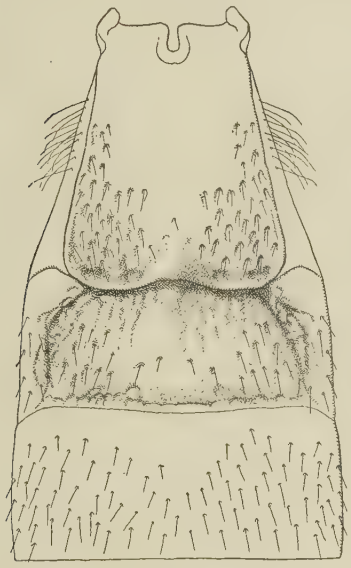
Apanteles spurius Wesmael.

Microgaster spurius Wesmael, 1837, *Nouv. Mém. Acad. Belg.* **10** : 49–50.
Microgaster insidens Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 72–73; 1848, **2** : 52; 1852, **3** : 56.
Apanteles insidens Ratzeburg, Lyle, 1916, *Entomologist* **49** : 252–253 (**syn. n.**).

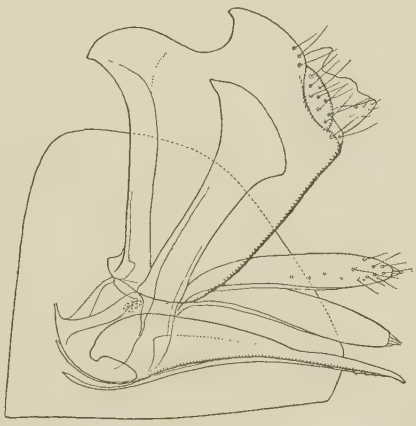
♀. Black; all trochantines more or less, front femora (save at base), front and middle tibiae wholly, front and middle tarsi (save perhaps for some darkening and for the black feet), middle femora at apex or in about apical third, hind femora at extreme base below, and hind tibiae in basal half or two-thirds, red testaceous; palpi and tibial spurs pale; wings infumated, and the setae coloured; costal veins largely, and other veins in basal

fourth of wing, testaceous or red testaceous; remaining veins, stigma, and metacarp, brown; stigma uniformly opaque.

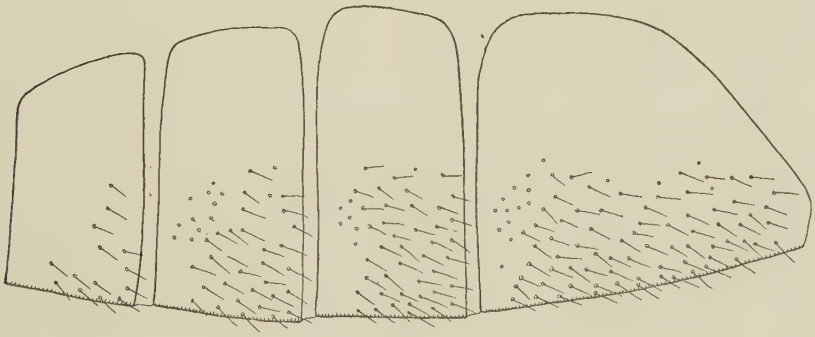
♂. More usually darker than ♀, so that the front femora in quite the basal half and the middle tibiae in apical third are darkened, the middle femora almost entirely black, and the hind tibiae red testaceous in only the basal half, with the costal veins of the fore-wing largely brown; otherwise agrees in colour closely with my description of ♀.



7



8



9

FIG. 7.—*Apanteles spurius* Wesmael; basal tergites, ♀.

FIGS. 8 & 9.—*Apanteles spurius* Wesmael: 8, genitalia, ♀; 9, apical ventrites, ♀.

♀♂. *Head*: face, clypeus, and frontal orbits, minutely punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frons and vertex with minute and exceedingly minute punctation (degrees 2 and 1); posterior ocelli equidistant from each other and the eyes, or rather nearer to the eyes; flagellum of ♀ equal to or longer than length of head together with twice the length of the thorax, of ♂ approaching three times the length of the thorax. *Thorax*: mesonotum closely punctate throughout (degrees 2

and 3), the lines of the notauli visible, the punctures there and in the large posterior area into which they lead being very closely or contiguously placed and stronger (degrees 3 and 4), the mesonotum narrowly across extreme apex with only exceedingly minute punctures; disc of scutellum throughout with close, shallow, indefinite punctation; propodeon with transverse basal carinae that are commonly strongly marked but as commonly only weakly so, and with a very weak or even entirely obsolete median longitudinal carina, the propodeon more or less smooth basally to the transverse carinae, otherwise reticulately rugose, this reticulation broader in the apical angles, or the apical angles perhaps even smooth. Metacarp just shorter than stigma. *Legs*: hind coxae basally above with a large area strongly punctate (degree 4), at apex above longitudinally striate, otherwise above and on outer faces throughout with well-separated minute punctation (degree 2); hind tibial spurs subequal, the longer spur two-thirds the length of the basal segment of the hind tarsus. *Abdomen* (figs. 7, 8 and 9): 1st tergite basally excavate, apically turned over, throughout apical third or two-fifths rugoso-punctate or at least minutely rugoso-punctate save down the middle narrowly where it is smooth or at least smoother; 2nd tergite weakly rugose, often even indefinitely so; 3rd tergite smooth across base and apex and in a median basal triangle, otherwise minutely punctate; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; ovipositor sheaths shorter than the basal segment, shorter than combined length of 2nd and 3rd segments, just shorter than twice the length of the 3rd segment, the ovipositor equal in length to the basal segment, of the hind tarsus; hypopygium of ♀ with its apex cut away to form a short lower-posterior margin.

Length, 2·5–3·25 mm.

Redescribed from the following material:—British Museum: Lyle Collection, New Forest, a card of four (4 ♀♀), ser. no. 157, pup. 6.vi.1908, em. 15, 16, 17.vi.1908, a card of two (1 ♀, 1 ♂), ser. no. 328, pup. 11–12.vi.1909, em. 18.vi.1909, a card of five (3 ♀♀, 2 ♂♂), ser. no. 337, pup. 19.vi.1909, em. 28.vi.1909, a card of four (1 ♀, 3 ♂♂), ser. no. 542, 21.x.1910, a card of one (1 ♂), ser. no. 546, 26.vi.1910, three cards of five, one, and one (5 ♂♂; 1 ♂; 1 ♂), ser. nos. 998 and 999, 1910, a card of four (3 ♀♀, 1 ♂)—originally of five, ser. no. 1004, vii.1910, a card of fourteen (12 ♀♀, 2 ♂♂)—originally of fifteen, ser. no. 1277, pup. 25.v.1911, em. 2.vi.1911, a card of four (3 ♀♀, 1 ♂), ser. no. 1279, pup. 28.v.1911, em. 5.vi.1911, a card of eight (6 ♀♀, 2 ♂♂)—originally of eleven, ser. no. 1297, 8, 9.vi.1911, a card of seven (2 ♀♀, 5 ♂♂), ser. no. 1338, 19.vi.1911, a card of seven (7 ♂♂), ser. no. 1342, pup. 9, 10.vi.1910, em. 19, 20. vi.1910, a card of nine (3 ♀♀, 6 ♂♂)—originally of twelve, ser. no. 1393, 6.vii.1911, four cards of two, two, one, and one (2 ♂♂; 1 ♀, 1 ♂; 1 ♀; 1 ♂), ser. no. 1394, 7.vii.1911, a card of three (1 ♀, 2 ♂♂), ser. no. 1413, 10.vii.1911, a card of one (1 ♀), ser. no. 1430, 22.vii.1911, a card of three and of one (1 ♀, 2 ♂♂; 1 ♂), ser. nos. 1721, 1727, pup. 14.x.1911, em. 26, 29.ii.1912, a card of thirteen (9 ♀♀, 5 ♂♂)—originally of fourteen, ser. no. 1960, 23.v.1912, a card of eight (4 ♀♀, 4 ♂♂), ser. no. 2437, 19.x.1913, a card of one (1 ♀), ser. no. 2657, pup. x.1914, em. 31.iii.1915, a card of three (3 ♀♀), ser. no. 2821, xi.1915, a card of one (1 ♀), ser. no. 2825, pup. x.1915, em. 16.i.1916, Gog Magogs, a card of seven (7 ♀♀), ser. no. 3199, 21.vi.1917, a card of five (4 ♀♀, 1 ♂), ser. no. 4179, vii. 1919, Chandler's Ford, a card of three and a card of four (3 ♂♂; 2 ♀♀, 2 ♂♂), ser. nos. 3446, 3447, 20, 26.iv.1918, and Shibden, Halifax, a card of four (4 ♀♀), ser. no. 4920, 6.vii.1925 (*G. T. Lyle*), all det. Lyle as *insidens* Ratz. Cambridge University Museum: a card of six (3 ♀♀, 3 ♂♂), Bignell ser. no. 3696, in Bign. reg. dated 19.vi.1888, det. Bignell as *difficilis* Nees; Essex, three cards of two (1 ♀, 1 ♂; 1 ♀, 1 ♂; 2 ♂♂), two cards of one (1 ♀; 1 ♂), 1933, St. Osyth, a card of two (2 ♂♂), 1932 (*W. S. Gilles*). Manchester Museum: Staffordshire, Madeley,

1 ♀, 5 ♂♂, 1925 (*H. W. Daltry*). MINISTRY OF AGRICULTURE, HARPENDEN: Harpenden, Herts, 4 ♀♀, 1 ♂, 15.ix.1924, det. Lyle as *insidens* Ratz.; Birmingham, Knowle, 4 ♀♀, em. 21.vi.1934. IMPERIAL FORESTRY INSTITUTE: Russell's Enc., Forest of Dean, a card of twelve (9 ♀♀, 3 ♂♂), 30.vi.1931 (*J. M. B. Brown*), det. as *insidens* Ratz. NATIONAL MUSEUM OF IRELAND, DUBLIN: Ireland, co. Kildare, Athy, 7 ♀♀, 3 ♂♂, 12.vi.1933, em. 20.vi.1933, West Galway, nr. Lake Carrib, 17 ♀♀, 4 ♂♂, em. 19–22.vi.1937 (*Rev. K. M. Dunlop*). ZOOLOGISCHES MUSEUM DER UNIVERSITÄT, BERLIN: General Accessions, Sachsen, 16 ♀♀, 1 ♂, 6.vi.1893 (*Dr. R. Krieger*); Berlin, 3 ♀♀, 2 ♂♂, x.1902. FORSTLICHE HOCHSCHULE, EBERSWALDE: Ratzeburg Collection, three card-points of two each (6 ♀♀) (one ♀ the *type* of *insidens* Ratz.). MUSEO CIVICO DI STORIA NATURALE, GENOVA: Liguria, Borzoli, 7 ♂♂, v.1915 (*E. Borgioli*). NATURHISTORISKA RIKSMUSEUM, STOCKHOLM: Germany, Saxony, 5 ♀♀, 2 ♂♂, 2 ?, 95, 95.2 (*Herr Schutze*); Sweden, Jacobsberg, 8 ♀♀, 1919.38, 11.vii.1919 (*Nordström*). K. G. BLAIR'S COLLECTION: Epping, a card of five (4 ♀♀, 1 ♂), 1931 (*T.R.E.*), det. by Blair as *insidens* Ratz.; Portsmouth, a card of three (3 ♀♀) (*E.A.C.*); Bayford, Herts, a card of five (3 ♀♀, 2 ♂♂), pup. autumn 1932, em. v.1933 (*T. R. Eagles*); Brailes, a card of six (2 ♀♀, 4 ♂♂) and a card of seven (3 ♀♀, 4 ♂♂), vi.1918, det. Lyle as *insidens* Ratz. and det. Blair as ? *insidens* Ratz.; a card of three (1 ♀, 2 ♂♂) and a card of two (2 ♂♂), 20/11, det. Lyle as *insidens* Ratz.; a card of three (2 ♀♀, 1 ♂), det. Lyle as *insidens* Ratz.; 1 ♂, 7/25, det. Blair as ? *insidens* Ratz.; Epping, a card of eight (6 ♀♀, 2 ♂♂), 73/31, (*T. R. Eagles*), det. as ? *picipes* Bouché; Epping Forest, a card of nine (2 ♀♀, 7 ♂♂), par. pup. 20.x.1934, em. v.1935 (*T. R. Eagles*); Kent, Dunton Green, a card of five (5 ♀♀) (*R. W. Attwood*). O. W. RICHARDS'S COLLECTION: Bucks, Burnham Beeches, 4 ♀♀, 1 ♂, 37966–37970, em. 20.viii.1935 (*Mollison*). A. C. W. WAGNER'S COLLECTION: Bahrenfeld, 2 ♀♀, vii.1908; Sachsenwald, 3 ♀♀, 1 ♂, 17.vi.1907, 2 ♀♀, 2 ♂♂, 17.vi.1906; Klövensteen, 3 ♀♀, 2 ♂♂, 28.vi.1931. D. S. WILKINSON'S COLLECTION: Warwick, 6 ♂♂, 1928 (*Miss Cheesman*); Chandler's Ford, Hants, 7 ♀♀, 6 ♂♂, 6.vi.1934; Hoddesdon, Herts, a card of eleven (11 ♂♂), 17.vi.1932 (*T. R. Eagles*); Pamber Forest, Hants, 6 ♀♀, 8 ♂♂, 11.vi.1936, Burghfield, Reading, Berks, 1 ♂, 9.vi.1936 (*H. L. Dolton*); Sandhurst, Kent, a card of two (2 ♀♀), em. ix.1933, 14 ♀♀, 1 ♂, vi.1939 (*G. V. Bull*).

Further material examined:—MUSEÉ ROYAL D'HISTOIRE NATURELLE, BRUXELLES: Wesmael Collection, 1 ♀ (*type* of *spurius* Wesm.), 1 ♂, and 1 ?, mus. ser. no. 2001. D. S. WILKINSON'S COLLECTION: Bayford, Herts, a card of six (6 ♀♀), xii.1932, 1 ♂, pup. autumn 1932, em. 26.iv.1933 (*T. R. Eagles*).

Type of *spurius* Wesm. in the Wesmael Collection, Musée Royal d'Histoire Naturelle, Bruxelles, mus. ser. no. 2001. *Type* of *insidens* Ratz. in the Ratzeburg Collection, Forstliche Hochschule, Eberswalde.

[But see note at end of Commentary re Ratzeburg type material of this species.]

Host. Wesmael's original description of his *spurius* is without host record. Ratzeburg originally described his *insidens* to have been bred from the Agrotid *Bombyx*, now *Diloba, caeruleocephala* L.

Of the material of this species that I have used for my redescription, or, otherwise, that I have had before me, Lyle's specimens numbered 157, 337, 542, 546, 3199, and 4920, are recorded to have been bred from the Geometrid *Phigalia pedaria* F., as are also the twelve specimens from the Forest of Dean, Blair's material numbered 20/11 and 7/25, and his card of three without data, Wagner's four specimens dated 17.vi.1906, and Dolton's fourteen specimens from Pamber

Forest. Lyle's material numbered 328 and 1297 is recorded to have been bred from the Agrotid *Asterocopus*, now *Brachionycha*, *sphinx* Hufn. Lyle's material numbered 998, 999, and 1277, is recorded from the Lasiocampid *Poecilocampa populi* L., as are also Krieger's seventeen specimens, the eight females from Jacobsberg, Blair's three females from Portsmouth and his two cards of six and seven from Brailes, Wagner's four specimens dated vi.1907, and the eleven males from Hoddesdon. The Lyle material numbered 1004 is recorded to have been bred from the Geometrid *Himera*, now *Colotois*, *pennaria* L., and his material numbered 1279 from the Agrotid *Miselia*, now *Meganephria*, *oxyacanthae* L. The Lyle material numbered 1338 and 1342 is recorded from the Agrotid *Diloba caeruleocephala* L., as is also the Ministry of Agriculture's material from Knowle, Dunlop's material from Kildare and West Galway, the seven males from Liguria, Wagner's five specimens dated 28.vi.1931, and the material from my own collection from Warwick, Chandler's Ford, Reading, and Sandhurst; while, in addition, the material on Bignell's card numbered 3696 is recorded from this host by Bignell, and, as I have stated above, the six Ratzeburg females were originally described from this host by Ratzeburg. The Lyle material numbered 1393, 1394, 1413, and 1430, together with Blair's eight specimens bred by Eagles from Epping, are recorded from the Geometrid *Amphidasys*, or *Pachys*, now *Biston*, *strataria* Hufn., while Daltry's specimens from Madeley, the specimens from Harpenden dated 15.ix.1924, the specimens from Berlin dated x.1902, Blair's nine specimens bred by Eagles from Epping and his five females from Dunton Green, the five specimens from Richards's collection, and Bull's two females from Sandhurst, are recorded from *Amphidasys*, or *Pachys*, now *Biston*, *betularia* L. The Lyle material numbered 1721, 1727, 2657, 2821, and 2825, and Blair's five specimens bred by Eagles from Epping, are recorded from the Geometrid *Metrocampa*, now *Campaea*, *margaritata* L., and Lyle's material numbered 2437 from the Geometrid *Gonodontis bidentata* Clerck. His material numbered 1960 Lyle records from the Agrotid *Catocala promissa* Esp., and that numbered 4179 from the Notodontid *Cerura vinula* L. The remainder of the Lyle material, namely that numbered 3446 and 3447, and Gilles's material from Essex and the two series from Bayford bred by Eagles, are recorded from the Geometrid *Selenia bilunaria* Esp. (= *S. illunaria* Hübn.), while Wagner's two females from Bahrenfeld are recorded from this host with a query. Finally, Gilles's material from St. Osyth is recorded from the Lasiocampid *Bombyx*, now *Macrothylacia*, *rubi* L. and Schutze's nine specimens from the Tortricid *Olethreutes*, now *Argyroploce*, *pruniana* Hübn.

In his register in a number of instances Lyle records the total size of the *Apanteles* broods. I publish these records here as they are not without interest. The material on his card no. 157 is part of a brood of 20; that on card no. 328, of a brood of 13; on card M no. 337, of 8; on cards nos. 998 and 999, of 14; on card no. 1277, of 17; on card no. 1279, of 5; on card no. 1297, of 11; on card no. 1393, of 22; on card no. 1394, of 20; on card no. 1413, of M 15, 12 being hyperparasitised; on card no. 1430, of 7; on cards nos. 3446 and 3447, of 13; and on card no. 4920, of 8. On cards nos. 1342, 1960, and 2437, every specimen in the brood emerged, and is mounted, namely 7, 14, and 8 specimens respectively. Lyle records further that his material on cards nos. 1721, 1727, and 2825, was forced. It may be noted, also, that Dr. Bull records his two females from Sandhurst to be only part of a brood.

There are a considerable number of references to this species in literature, either under the name *spurius* or *insidens*; and a number of additional hosts have been recorded.

Records I know for certain to be incorrect are not very numerous. Fitch (1884) records this species, under the name *spurius*, to have been bred or recorded by Bignell from the Agrotid *Leucania littoralis* Curtis; and Bignell (1887, 1890) himself gives this host. In the Harwood Collection there are two Bignell cards with the Bignell serial number 68. These are labelled, in the usual Fitch manner, "*spurius*", and the host in Bignell's register is given as *L. littoralis*; but the *Apanteles* is distinct from what I here understand to be *spurius* Wesm. Lyle (1916) also records this host. I have some of his material before me, namely two cards of 36 (originally 38) and 24 specimens numbered 1236 and 1237 respectively; it is quite clearly the same species as Bignell's to which I have just referred above. Bignell (1887; 1901) also records as a host the Agrotid *Agrotis*, now *Actebia*, *praecox* L., bred by himself and Porritt. In the Harwood Collection is a card of 18 labelled to have been bred from this host by G. T. Porritt, and determined as *Apanteles spurius*; the material is not referable to *spurius* however. Morley (1906) also has recorded *spurius* from Bignell material from *A. praecox*, and doubtless also is incorrect. Bignell (1885 : 200; 1887; 1901) has also recorded the Nymphalid *Melitaea aurinia* Rott. (= *M. artemis* Schiff.); this is also incorrect, the species he had before him being *A. melitaearum* Wilkn. Finally, Voukassovitch (1925) records the Pierid *Aporia crataegi* L., the *Apanteles* having been determined by Ferrière. I have before me from Ferrière's collection some of the material upon which this record was based; the species is not *A. spurius*. Emelianov (1906) and Picard (1921) have also recorded *Aporia crataegi* as a host of *spurius*; but from their descriptions of the parasite cocoons I am sure their determination of the *Apanteles* is in error. And, from all this evidence, I am equally sure that the records of this host by Wassiljew (1908), Portschinsky (1910), Gorininov (1914), Faure (1926), and Krasnyuk (1928), are also incorrect.

Records of hosts, for *A. spurius*, in addition to those I have already mentioned and the correctness or otherwise of which I am at the moment unable to determine are as follows. A number of them, even the large majority, are, I am convinced, incorrect. Ratzeburg (1852) records that Nördlinger bred numerous examples from the Notodontid *Bombyx*, now *Cerura*, *vinula* L., and this host has also been given, under the generic name *Dicranura* or *Harpyia*, by Rondani (1872 : 154), Reinhard (1881), and Brischke (1882 : 146–147), and, with a query, by Nordström (1921). Löw (1866) recorded from his own observation *A. spurius* to be parasitic upon the Agrotid *Mamestra*, now *Diataraxia*, *oleracea* L., and this record has been noted by Rondani (1872 : 160), Taschenberg (1880), Marshall (1885 : 180), and Goury & Guignon (1906), and by Meier (1927) and Zorin & Zorina (1929) under the generic name *Polia*. Laboulbéne (1877) states that Giraud bred this species from the Nymphalid *Vanessa*, now *Aglais*, *urticae* L. and the Zygaenid *Zygaena filipendulae* L., and Marshall (1885 : 180) has referred to these records. Bignell (1885 : 200; 1887; 1901 : 671), also, records *Aglais urticae* as a host, and Fitch (1884) and Marshall (1885) both refer to this record. Morley (1936 : 116) quotes a manuscript note by Marshall wherein he refers to "a solitary specimen bred by Bignell from *Vanessa urticae*"; it seems to me much more likely that Bignell's solitary specimen was really *Apanteles plutellae* Kurdj. Fitch (1881) records the Satyrid *Satyrus hyperantus* L., (1883) the Arctiid *Euchelia*, now *Tyria*, *jacobaeae* L., and (1884) the Arctiid *Arctia caja* L., and this latter host is given by Billups (1889). Brischke (1882) records a number of hosts, namely the Agrotids *Caradrina morpheus* Hufn., *Acronicta auricoma* Schiff., and *Dianthoecia xanthocyanea* Hüb., which is a species probably referable to *Hadena*, the Geometrids *Cidaria*, now *Thera*,

juniperata L., *Cidaria*, now *Ephirrhoë*, *galiata* Schiff., *Eupithecia sobrinata* Hübn., and *Eupithecia pimpinellata* Hüb., the Lasiocampids *Gastropacha*, now *Malacosoma*, *castrensis* L., and *Gastropacha*, now *Lasiocampa*, *trifolii* Esp., the Lycaenids *Lycaena*, now *Lysandra*, *corydon* Poda, and *Lycaena*, or *Polyommatus*, *circe*, by which doubtless is meant *circe* Hüb., which is now sunk under *Lycaena dorilis* Hüb., the Notodontids *Harpyia bifida* Brahm, now known as *Cerura hermelina* Goeze, and *Notodonta*, or *Lophopteryx*, *camelina* L., which is now *Lophopteryx capucina* L., the Nymphalids *Argynnis lathonia* L. and *Melitaea maturna* L., the Pyralid *Pionea forficalis* L., and the Zygaenid *Zygaena peucedani* Esp., which is now sunk under *Z. ephialtes* L. Bridgman (1884) records a single host, the Geometrid *Ephyra*, now *Cosymbia*, *orbicularia* Hübn., a record that other writers have referred to under the generic name *Codonia* or *Zonosoma*; the *Apanteles* material was bred by Fletcher and named by Fitch. Marshall (1885), in addition to many of the records I have already mentioned, states that Raynor bred this species from the Geometrid *Hypsipetes trifasciatus* Bork., which is now known as *Hydriomena coerulata* F.; and in subsequent work (1888; 1898 : 178) only gives one further host, namely that originally recorded by Billups (1889), the Geometrid *Halia*, now *Itame*, *wauaria* L., a species referred to by Fahringer under the generic name *Thamnonoma*. Mocsáry (1895) and Szépligeti (1896 : 179) record *spurius* from the Agrotid *Agrotis fugax* Treit., a record that has been referred to by Dalla Torre (1898 : 183). Vassiliev (1904) states that he himself bred this species from the Agrotids *Mamestra brassicae* L. and *Mamestra dissimilis* Knoch, this latter now known as *Hadena suasa* Schiff., on sugar-beet. Portschinsky (1910), Gavalov (1927), and Meyer (1934), record this species from the Lasiocampid *Malacosoma neustria* L., in Russia, and Johnson (1916) from the Nymphalid *Pyrameis*, now *Vanessa*, *cardui* L., in Ireland. Fahringer (1922 : 371) records that he himself bred this species from the Agrotid *Agrotis segetum* Schiff., the Hepialid *Hepialus sylvina* L., the Nymphalids *Polygonia c-album* L. and *Pyrameis*, now *Vanessa*, *atalanta* L., and the Pierid *Pieris rapae* L. Herold (1923) has referred to Fahringer's record of *A. segetum*, and Zolk (1930) and Bogdanov Katkov (1933) have also given this host. Rühl (1925) gives the Agrotid *Agrotis*, now *Diarsia*, *brunnea* Schiff., and Voukassovitch (1928) as a host in Serbia a species of *Pieris*. Wagner (1929) records from N.W. Germany the following hosts, namely the Agrotid *Plastenis subtusa* F., now known as *Zenobia subtusa* Schiff., and the Geometrids *Larentia*, now *Perizoma*, *alchemillata* L., *Pseudoterpna pruinata* Hufn., and *Tephroclystia helveticaria* B. var. *arceuthata* Freyer, which is now known as *Eupithecia intricata* Zett. var. *arceuthata* Freyer. Finally, Lepiney & Mimeur (1932) have recorded *A. spurius* as a parasite of the Lymantriid *Ocnogyna baeticum* Ramb., in Morocco, and Morley (1936), of the Tineid *Elachista adscitella* Stn., now known as *E. megerlella* Stn., in Durham. In addition, Martelli (1907), the source of whose information I do not know, records from literature the following species as hosts, namely the Agrotid *Hadena*, now *Apamea*, *maillardi* Geyer var. *difflua* Geyer, the Geometrid *Larentia autumnalis* Ström., which is now known as *Hydriomena coerulata* F., and the Lycaenid *Lycaena*, now *Polyommatus*, *hylas* Esp.; and in these it would seem he has been copied by Leonardi (1927) and Fahringer (1935). Martelli also gives the Pierid *Pieris brassicae* L., quoting Bouché as the authority, with a query; I do not understand this record—and compare also Faure's (1926) remarks as to this host. Other records from literature the original sources of which I do not know are those by Leonardi (1927), who gives the Lasiocampid *Trichiura crataegi* L., and by Fahringer (1922), who gives the Geometrid *Larentia*, now *Perizoma*, *bifasciata* Haw.

There is only one host record for *Apanteles insidens* in addition to those for *A. spurius* that I have already mentioned, and the correctness or otherwise of which I am unable at the moment to determine, namely that by Morley (1933), who gives the Agrotid *Rhyacia porphyrea* Hübn., which is now known as *Lycophotia varia* de Vill. I think, however, that I should perhaps also draw attention to Ratzeburg's record (1852 : 56) of *Arctia caja* L.

Other authors who have mentioned one or other of the above hosts, or who otherwise have referred either to *A. spurius* or *A. insidens*, are Billups (1890B, 1890D), Butterfield & Lyle (1929), Coulon (1935), Goury & Guignon (1906), Haines (1923), Ivanow (1899), Kaltenbach (1874), Kulagin (1913), Martelli (1908, 1931), Meier (1927), Morley (1933), Niezabitowski (1910), Rudow (1917), Rühl (1911, 1917, 1919), and Taschenberg (1880).

Cocoons. The cocoons are yellowish-buff, but soon turn almost white when exposed to light. The cocoons are attached to the host-larva in an upright position, but they usually fall off when the host-larva is more or less hairless.

Commentary. Wesmael originally described his *spurius* from two males and one female taken by himself in the outskirts of Brussels. In the Wesmael Collection standing under this name were three specimens, a female, a male, and a specimen of doubtful sex (its abdomen missing). These agree perfectly with Wesmael's description, with the possible exception only in the coloration of the wings, and are obviously the original three specimens; and I am selecting the female as the type, and so labelling it. They agree perfectly and in the minutest detail with all the material from which I have made the redescription of the species, with some of which material I myself compared them.

Ratzeburg originally described his *insidens*, in the first volume of his work, from an unstated number of specimens and as a parasite of " *Bombyx coeruleocephala.*" In the Ratzeburg Collection standing under this name, with the label written in his copper-plate handwriting, as was to be expected since the species was described in the first volume of his work, were six females mounted on three pins, two to a pin. One of these pins is labelled " coeruleoceph ", and, further, bears a larva of *coeruleocephala* with *Apanteles* cocoons attached to it exactly as described by Ratzeburg. These specimens agree perfectly with Ratzeburg's description, such as it is, and are clearly to be accepted; and I am labelling as type and cotype the two specimens on the pin with the larva, and the remaining four specimens as cotypes. All six specimens agree perfectly and in the minutest detail with the material from which I have made the redescription of the species, with all of which material I myself compared them.

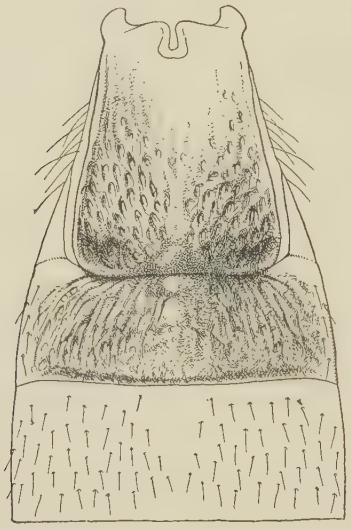
Apanteles gastropachae Bouché.

Microgaster gastropachae Bouché, 1834, *Nat. Ins.* : 157. Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 72; 1848, *Ichn. d. Forstins.* **2** : 52; 1852, *Ichn. d. Forstins.* **3** : 54.

♀♂. Black; the four anterior legs (save for the black coxae and feet and darkened trochanters), hind trochantines, hind femora (save for some considerable blackening at apex, sometimes darkening at base below, and even sometimes for darkening throughout apical third and narrowly above and below), and hind tibiae (save for darkened apex), red testaceous; hind tarsi darkened; palpi and tibial spurs pale; wings hyaline, and the setae coloured; stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown, all remaining veins red testaceous.

♀♂. *Head* : clypeus, face, frontal orbits, frons, and vertex, throughout with regularly placed, minute (degree 2) punctation; facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ longer than combined length of thorax and abdomen, about equal to or rather shorter than com-

bined length of head, thorax, and abdomen, of ♂ longer than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout closely punctate (degree 3), the lines of the notauli, the punctures of which are contiguously placed and perhaps rather stronger than elsewhere on the mesonotum, converging into a large, ill-defined, striato-punctate, posterior area; disc of scutellum punctate (degree 3); propodeon with numerous fine carinae diverging from the median apical lunule, so that



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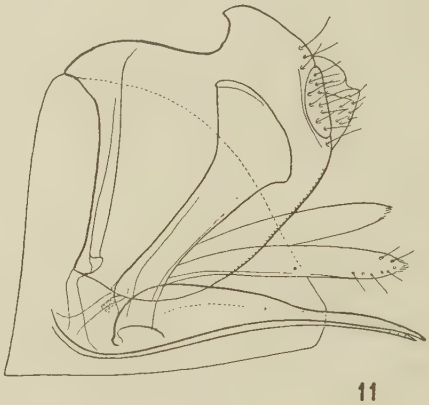

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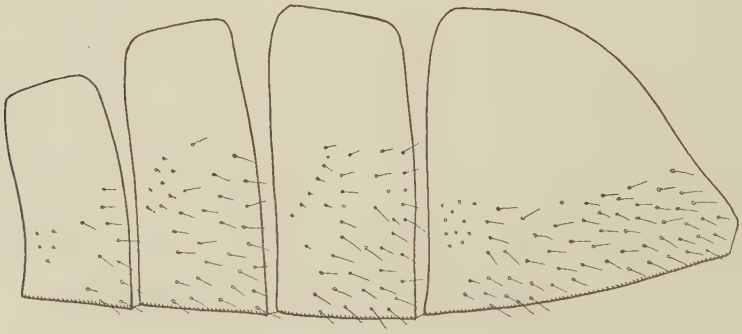

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Fig. 10.—*Apanteles gastropachae* Bouché; basal tergites, ♀.

Figs. 11 & 12.—*Apanteles gastropachae* Bouché: 11, genitalia, ♀; 12, apical ventrites, ♀.

medianly and throughout basally the propodeon is finely rugose; the apical lateral areas of the propodeon highly shining, entirely smooth (save perhaps for an occasional carina, or small portion of carina), and on each side occupying the whole of the more or less triangular area between the median lunule, the spiracle, and the apical angle, save for rugosity down the extreme lateral margin; the propodeon medianly in basal half distinctly sunken (or perhaps more rightly describable as tumescent in the basal half on each side), commonly with a smooth patch, and with the usual fine median longitudinal carina obsolete or wanting;

transverse basal carinae of propodeon commonly strongly in evidence; propodeon distinctly smoother narrowly right across base. *Legs*: hind coxae in a large area basally above strongly punctate (degrees 3 and 4), apically above and on outer faces minutely punctate (degree 2); the longer hind tibial spur two-thirds, and the shorter spur three-fifths, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 10, 11 and 12); 1st tergite in basal half excavate, and smooth and shining save for some occasional indefinite striation, in apical half turned over and rugoso-punctate, the punctures more usually clearly defined and strong (degrees 3 and 4); 2nd tergite with indefinite punctation and weak longitudinal sculpture, and with weak but more usually quite clearly defined lateral sulci; 3rd tergite smooth narrowly across base, rather more broadly across apex, and in a median basal triangular area, which area is variable in extent from large to almost wanting, the tergite otherwise minutely punctate; succeeding tergites minutely punctate; ventrites without median longitudinal suture; ovipositor sheaths shorter than the basal segment, and the ovipositor itself longer than the basal segment but considerably shorter than the combined length of the two basal segments, of the hind tarsus; hypopygium with its posterior angle cut away to form a short, lower-posterior margin.

Length, 2·0–2·5 mm.

Redescribed from the following material:—British Museum.: Lyle Collection, Gog Magogs, a card of five (5 ♀♀), 1.xi.1918, ser. no. 3856, a card of six (6 ♀♀), x.1918, ser. no. 3862, a card of three (2 ♀♀, 1 ♂), 14.v.1919, ser. no. 3882, and a card of two (2 ♀♀), 15.v.1919, ser. no. 3891 (*G. T. Lyle*), all det. Lyle as *gastropachae* Bé. Cambridge University Museum: Cambridge, 6 ♂♂ and a card of seven (7 ♂♂), 1915 (*F. Balfour-Browne*). Forstliche Hochschule, Eberswalde: Ratzeburg Collection, 1 ♂, det. Ratzeburg as *gastropachae* Bé. D. S. Wilkinson's Collection: England, Surrey, Dunsfold, 17 ♀♀, 11 ♂♂, coll. 14.v.1938, pup. 21.vi.1938, em. 28.vi.1938 (*R. L. E. Ford*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Bouché Collection, 1 ♂ (*type*).

Type in the Bouché Collection, Zoologisches Museum der Universität, Berlin; register serial number 13109.

Host. Bouché originally described his *gastropachae* as having been bred from the Lasiocampid "*Bombyx* (*Gastropacha*) *neustria* L.," a species now referred to *Malacosoma*; and from this host is recorded the following material of that from which I have made my redescription, namely Ratzeburg's single male, the thirteen males bred by Balfour-Browne, and Ford's series from Dunsfold. In addition, all the Lyle material is recorded by him to have been bred from the Lasiocampid *Gastropacha quercifolia* L.

References in the literature to this species are not numerous. Ratzeburg (1852), in addition to *M. neustria*, gives as a host the Tortricid *Tortrix*, now *Eucosma*, *immundana* Fisch., and is followed in this by Rondani (1873), using *Paedisca*, and by Brischke (1882), using *Grapholita* as the generic name, records I am not at this time prepared to accept; while Eckstein (1911), who incorrectly synonymises *gastropachae* and *rubripes*, gives the Lasiocampid *Dendrolimus pini* L., a record that in all probability is also incorrect. Watanabe (1932) records breeding *gastropachae* from *M. neustria* in Japan; and other records of *neustria* as the host are those of Decaux (1892), Goureau (1867), Rondani (1872), and Taschenberg (1880), which latter records, of course, have only been copied from the earlier writers.

Cocoons very pale cream, approaching white; solitary, or placed loosely together.

Commentary. Bouché originally described his *gastropachae* from apparently,

but by no means unquestionably, the female sex only, and as a gregarious parasite of "*Bombyx* (*Gastropacha*) *neustria*." In the Bouché Collection is a single male labelled in the usual manner for this collection with five labels—"Berlin"; the serial number 13109; a red "type" label; the usual Stein label, "gastropachae Bouch.*"; and with the usual Enderlein label, but in this case reading "*Apanteles rubripes* Hal.?". This male specimen agrees perfectly with Bouché's original description, such as it is, and, further, it agrees perfectly and in the minutest detail with all the material before me from which I have redescribed the species and which was bred from "*Gastropacha*" *neustria* and *Gastropacha quercifolia*. Consequently, I am convinced that Stein and Enderlein were correct, failing other female material, to accept this male as the type of the species.

Nees synonymised *gastropachae* Bé, under his *reconditus*, with a query. But the type of *reconditus* is lost, and the reviser of this latter species whom I am accepting has not treated it as synonymous with *gastropachae*.

Reinhard was also unable to recognise *gastropachae*, and sunk it under *rubripes* Hal. Marshall (1888 : 419) followed, of course, but stated that this synonymy seemed to him to be doubtful. *Apanteles rubripes* and *gastropachae* are, in fact, remarkably similar, but are distinct.

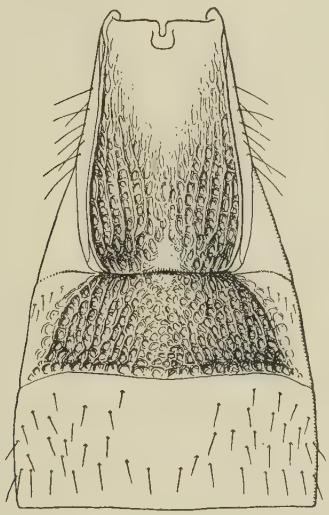
Apanteles geryonis Marshall.

Apanteles geryonis Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 180–181; 1888, *Spécies Hymen. d'Eur.* **4** : 427. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 671. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 408–409. Cockayne & Hawkins, 1932, *Ent. Rec.* **44** : 23.

♀♂. Black; tegulae darkened, but not always very strongly so; in more lightly coloured ♀♀ the four anterior legs entirely (save for their coxae and feet), hind trochanters more or less, hind trochantines, hind femora and tibiae (save for some darkening on each at extreme apex), hind tarsi, and basal ventrites, red testaceous, in darker ♀♀ all trochanters much darkened or even black, the apical tarsal joints of the four anterior legs and all the hind tarsal joints much darkened, the apical fourth of the hind tibiae strongly darkened, and the hind femora strongly darkened or black above and throughout the apical two-fifths or half, while in even still darker ♀♀ the hind femora can be entirely black save for a small, obscure, red testaceous patch on the sides in the basal half, the middle femora darkened, and the palpi obscurely darkened; the ♂♂ habitually darker than the ♀♀; in the ♂♂ at least apical half of front femora, front and middle tibiae, front and middle tarsi (save for darkened apical joint and feet), hind tibiae in basal half, and basal ventrites, red testaceous; the middle femora of ♂♂ much darkened, and the hind femora often with some testaceous markings; palpi and tibial spurs otherwise pale; wings infumated throughout, the setae apparently coloured; the stigma, metacarp, and veins, brown; stigma uniformly opaque.

♀♂. *Head*: face and clypeus throughout punctate (degree 3) and dull, or even describable as minutely rugoso-punctate; facial depressions much nearer to apex of clypeus than to the eyes; frons and vertex shining and smooth and with only exceedingly minute (degree 1), well-spaced, punctation; posterior ocelli just nearer to each other than to the eyes; flagellum of ♀ equal to or rather longer than combined length of thorax and abdomen, shorter than combined length of head, thorax, and abdomen, of ♂ equal to or rather longer than combined length of head, thorax, and abdomen. *Thorax*: mesonotum strongly punctate (degree 4), closely so and dull or even describable as rugoso-punctate along the lines of the notauli and in the large posterior area into which they lead, narrowly across extreme apex entirely smooth; disc of scutellum punctate (degree 3); propodeon coarsely, but not strongly, reticulately rugose, and with strong, well-marked, transverse basal carinae. *Legs*: hind coxae basally above strongly punctate (degree 4), apically above and

on outer faces punctate (degree 3); the hind tibial spurs more or less subequal, the shorter spur just longer than half, and the longer spur about two-thirds the length of the basal joint of the hind tarsus. *Abdomen* (figs. 13, 14 and 15): 1st tergite basally excavate, shining, and more or less smooth, medianly sometimes weakly tumescent, apically turned over, in the apical half or three-fifths rugose, in the apical half with a weakly depressed median longitudinal area, and with the smooth median apical lunule much in evidence;



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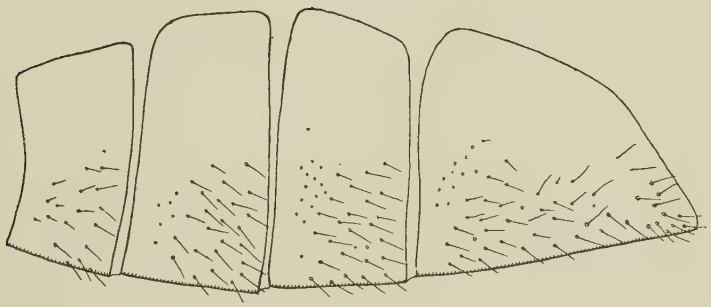

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FIG. 13.—*Apanteles geryonis* Marshall; basal tergites, ♀.
FIGS. 14 & 15.—*Apanteles geryonis* Marshall: 14, genitalia, ♀; 15, apical ventrites, ♀.

the shape of the 1st tergite rather variable, since in smaller specimens the lateral sides are straighter than in larger specimens, where they are slightly rounded in the apical half; 2nd tergite rugose; 2nd suture strongly marked, commonly slightly bisinuate, sometimes quite strongly so; 3rd tergite smooth and shining, with a single row of minute punctures across the base of about the apical third, and also throughout each lateral two-fifths of the tergite basally to this row; succeeding tergites apparently at most with two transverse rows of minute punctures; ventrites without median longitudinal suture; ovipositor sheaths just shorter than the basal joint, and the ovipositor just shorter than the combined

length of the two basal joints, of the hind tarsus; hypopygium at apex truncate or perhaps just slightly acute.

Length, 2·0–2·5 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a card of two (2 ♂♂), 19 June 1882, ser. no. 688 [probably, but cut; see Commentary]. Bignell Collection: a card of two (2 ♂♂), 19.vi.1882, Bignell reg. no. 688; a card of four (1 ♀, 3 ♂♂), 19.vi.1882, without any register serial number; and a card of four (2 ♀♀, 2 ♂♂), Bignell reg. no. 3297, where it may be seen the specimens were bred in 1886, previously determined by Bignell as and in his collection under "*nothus*, Reinh." Zoologisches Museum der Universität, Berlin: Berlin, 5 ♂♂, 1.vi.1901 (*Ude*). A. C. W. Wagner's Collection: Ohmoor, 1 ♀, 1 ♂, v.1931. Imperial Institute of Entomology: British Isles, 12 ♀♀, ser. no. 137/34 (*Dr. E. A. Cockayne*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Berlin, 7 ♀♀, 9.vii.1890 (*Thurau*).

Type lost; *neotype* in the Bignell Collection.

Host. Marshall originally described his species to have been bred by Bignell from the Zygaenid, *Procris geryon* Hübn., and all the Bignell material referred to by me above, including the two males in the Marshall Collection, is recorded from this species, either on the card itself or in the register. All the remainder of my material was bred from this Zygaenid genus also; the two males in Wagner's collection, and the seven females dated 1890, are recorded from *Ino*, now *Procris*, *pruni* Schiff., and the five males dated 1901 from *Ino*, now *Procris*, *statices* L., while the twelve females bred by Dr. Cockayne are recorded from *Procris cognata* H.-Sch.

Bignell himself also (1901, *Trans. Devon. Ass. Adv. Sci.* **33**) published a record giving *geryon* as a host of this *Apanteles*. Cockayne & Hawkins (1932, *Ent. Rec.* **44**) gave *cognata* as a host, their material having been collected at Lewis and determined by Blair; it is not, I think, the material I have before me here. This record has been substantiated, and consequently I am including the reference in the synonymy.

Cocoons white, held loosely together.

Commentary. Marshall originally described this species from three females, and added, in the next paragraph, the words "Bred by Bignell from *Procris geryon*, Hüb."; and Bignell, in his paper of 1901, records that he bred this *Apanteles* from *Ino geryon* on 19 June 1882. As I have recorded above, in the list of material from which I have redescribed the species, there is in the Marshall Collection a card of two males, and in the Bignell Collection (originally standing under this name) a card of one female and three males, and a card of two males: and that is all. It is quite obvious, from writing on the underside of the cards and from the Bignell serial number, as hereinafter discussed, that this material is all the same series, or if not one brood then certainly bred at the same time; but it is, also, as equally obvious, from the numbers of the specimens on the cards and their sex, that none of it, not one of the three cards, can possibly be accepted as the material Marshall originally had before him, despite red type-labels with which misguided enthusiasts have seen fit to adorn some cards of it. The type is lost, therefore. Despite the loss of the type, however, it is quite clear that the material we are discussing is truly referable to *A. geryonis*, and that it is almost undoubtedly the series, or part of the series, from which Marshall had his three females. The card of four has written on the underside "From *Procris geryon*—19 June 1882"; the card of two in Bignell's collection

has on the underside the remains of the word *geryonis*, and " 19 Jun 1882 ", and on the upperside the serial number 688; and the card in the Marshall Collection, which has obviously been cut in half lengthwise, has the words " From— gery. . . .— 19 J . . .—68 . . .", while the pin bears a label " Geryonis Marsh " : and the information in Bignell's register, against his serial number 688, exactly corresponds. Of course, as additional proof, all the other material from which I have redescribed the species, and which was bred from *Procris*, agrees perfectly and in the minutest detail. I have selected as the neotype, and so labelled it, the single female from the cardful of four (1 ♀, 3 ♂♂) in the Bignell Collection, my reason being that this is the only remaining female specimen of the original series.

The cardful of four, Bignell serial number 3297, had been determined previously as *A. nothus*, and was found by me in Bignell's collection standing under that name.

Apanteles nothus Marshall.

Apanteles nothus Reinh. MS., Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 186.
Apanteles nothus Reinhard, Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 436. Fitch, 1881, *Entomologist* **14** : 142; 1884, *Entomologist* **17** : 68. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 672.

♀♂. Black; the front legs (except for the black coxae and feet, and for the trochanters, trochantines, and basal fourth of the femora which may be either darkened, slightly darkened, or red testaceous), the middle femora at apex (below very often more extensively than merely at apex), the middle tibiae (except, particularly in old material, for slight darkening on the apical third), middle tarsi (except the feet), hind trochantines often, hind femora medially sometimes or in the basal half below sometimes (but even then rarely definitely), and hind tibiae (except for their darkened apical third), red testaceous [2]; hind tarsi darkened; palpi and tibial spurs pale; wings perhaps just faintly infumated evenly throughout, the setae coloured; wing-veins, stigma, and metacarp, light brown (in older material light red-brown); stigma uniformly opaque.

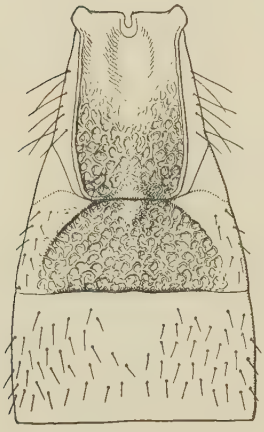
♀♂. *Head* : face and clypeus punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli equidistant from each other and from the eyes; flagellum of ♂ considerably longer than the combined length of head, thorax, and abdomen, longer even than the combined length of thorax and abdomen together with twice the length of the head, of ♀ rather shorter than combined length of head, thorax, and abdomen, but rather longer than combined length of thorax and abdomen, and definitely longer than combined length of head, thorax, and the three basal tergites. *Thorax* : mesonotum and disc of scutellum pruinose, or with closely placed, weak punctation that gives a pruinose effect, or perhaps more rightly describable as very finely and very weakly rugose; propodeon, in addition to the irregular, weak, quite widely placed reticulate carination that makes the propodeon coarsely but weakly rugose, with a very weak median longitudinal carina which is very variable in its length, and with short, transverse basal carinae which are sometimes relatively quite strong. *Legs* : hind coxae basally above throughout with separated, strong (degree 4) punctures, apically above longitudinally aciculated, otherwise on outer faces above with very widely separated minute punctation; hind tibial spurs equal, or at least subequal, half the length of the basal joint of the hind tarsus; hind tarsus, even without claw, longer than hind tibia. *Abdomen* (figs. 16, 17 and 18) : 1st tergite in about the basal two-fifths or half excavate, smooth, and shining, in about the apical half turned over and weakly rugose; 2nd tergite weakly rugose; 2nd suture well marked; 3rd tergite smooth and shining, with much well-separated, minute (degree 1) punctation save across base and apex; succeeding tergites with the usual

[2] Extent and strength of coloration of legs variable.

minute punctation; ventrites of ♀ without median longitudinal suture; ovipositor sheaths shorter than the basal joint of the hind tarsus; hypopygium just not truncate, but just slightly rounded.

Length, 1·75–2·0 mm.

Redescribed from the following material:—British Museum: Marshall Collection, two cards of two (2 ♀♀, and 1 ♀, 1 ♂); Lyle Collection, a cardful of thirty (25 ♀♀, 4 ♂♂, 1 ?), Chingford, 14.vii.1923 (*E. A. Cockayne*), Lyle serial



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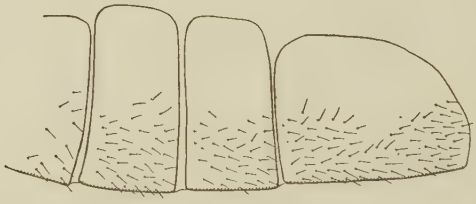

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Fig. 16.—*Apanteles nothus* Marshall; basal tergites, ♀.

Figs. 17 & 18.—*Apanteles nothus* Marshall: 17, genitalia, ♀; 18, apical ventrites, ♀.

number 4681. Bignell Collection: a cardful of six (6 ♀♀), serial number 724, for which Bignell's register gives the date as 2 July 1882; another cardful of six (4 ♀♀, 2 ♂♂), without serial number (but see Commentary); a cardful of eight (5 ♀♀, 3 ♂♂), serial number 239, for which the register gives 7 Sept. 1881. Bridgman Collection: a cardful of two (1 ♀, 1 ♂) and a cardful of three (2 ♀♀, 1 ♂), Bridgman serial number 752 (see Commentary). Fitch Collection: a cardful of three (3 ♀♀), Bignell serial number 96, for which the register gives 26 June 1881; a card that had held originally eight specimens, but now only three much damaged specimens, Bignell serial number 125, and labelled "A. nothus Rhd., 5.vii.81, G.C.B."; a cardful of two (2 ♀♀), Bignell serial number 239, and labelled "A. nothus Rhd., 13.ix.81, G.C.B." A. C. W. Wagner's Collection: Borstel, 4 ♀♀, 2 ♂♂, 16.vi.1901, 17.vi.1901, 19.vi.1901, 23.vi.1901, ser. no. 515; Bergedorf, 6 ♀♀, 29.vi.1903, 30.vi.1903, ser. no. 97, 2 ♀♀, 3 ♂♂, 1.vii.1904, 6.vii.1904, ser. no. 85; Meiendf, 3 ♀♀, 1 ♂, vi.1903, ser. no. 114; Sachsenwald, 1 ♂, 30.vi.1903, ser. no. 101; Dassendf, 1 ♀, 2 ♂♂, 25.vi.1905, 29.vi.1905, ser. no. 92, 3 ♀♀, vii.1916, ser. no. 67. Imperial Institute of Entomology: Hoddesdon, Herts, England, 17 ♀♀, 4 ♂♂, 1932 (*T. R. Eagles*).

Type in the British Museum.

Host. The two cardfuls each of six specimens in the Bignell Collection referred to above amongst the material from which I have redescribed the species are recorded, either in his register or on the card, to have been bred from the Geometrid, *Anticlea*, now *Earophila*, *badiata* Hübn. Other series also recorded to have been bred from this host, and also amongst the material from which I have redescribed the parasite, are both cardfuls in the Bridgman Collection, the cardful of three and the cardful of three reduced from eight, both in the Fitch Collection, the twenty-one specimens from Hoddesdon, and, in the Wagner Collection, the series nos. 85, 92, 97 (all three under the name *Scotosia badiata*), and 67 (under the name *Larentia badiata*). The remaining material from the Wagner Collection with host record is also from a Geometrid, the series no. 101 being recorded from *Cidaria sordidata*, which is now known under the name *Hydriomena furcata* Thunb. The series in the Bignell and Fitch Collections with the Bignell serial number 239 are recorded in Bignell's register to have been bred from the Satyrid, *Epinephele janira* L., now known as *Maniola jurtina* L.; but in the register there is a query mark against this record, and it is also recorded that the *Apanteles* cocoons had only been found and not definitely bred—this information is ignored by Marshall when listing the hosts.

Two other hosts mentioned by Marshall in his original description are the Geometrid, *Melanippe*, now *Epirrhoë*, *galiata* Hübn., and the Arctiid, *Spilosoma*, now *Diacrisia*, *menthastri* Esp., but these records must be treated with reserve (see Commentary).

In addition to the hosts mentioned above, *A. nothus* has been recorded from the following by the following authors, but the records must, of course, be treated with reserve as the material has not been examined by me: by Fitch (1881, *Entomologist*: 142) from the Geometrid *Cidaria*, now *Lygris*, *pyraliata* Schiff., by Marshall (1888) from the Geometrid *Abraxas grossulariata* L., by Bignell (1901, *Trans. Devon. Ass. Adv. Sci.* **33**: 672) from the Geometrid *Anticlea*, now *Euphyia*, *rubidata* Schiff., by Morley (1906, *Entomologist* **39**: 101) from *Anticlea sinuata* Hb., now *Euphyia cuculata* Hufn., and by Rühl (1919, *Soc. entom.* **34**: 40) from the Satyrid *Melanargia galathea* L.

Finally, the following records are definitely incorrect on account of the *Apanteles* having been wrongly determined; and in this connection reference should be made to the Commentary, under *nothus*, for further information as to the series concerned:—The remaining host record in the original description, namely the Agrotid, *Tethea*, now *Ipimorpha*, *retusa* L.; the record by Lyle of the Geometrid, *Phigalia pedaria* F.; and a record by Bignell, not I believe published, of the Zygaenid *Ino*, now *Procris*, *geryon* Hübn.

Cocoons white, heaped together loosely and held by one or two strands.

Commentary. The references and synonymy that I am publishing at this time under this name show not only that *nothus* was originally described by Marshall, but also that Reinhard never wrote on this species at all. Further, an examination of the papers to which I have referred in the synonymy will show that the authorship of the species cannot be ascribed to Fitch, despite the fact that he published on it, under the name *nothus*, as early as in 1881, and yet again in 1884. It was not without certain difficulty, therefore, that the true value was established of the various and quite numerous cardfuls of material, all determined as *nothus*, in the British Museum (Marshall Collection), Bignell, Bridgman, and Fitch Collections.

It would perhaps be advisable, in the first place, to state shortly how, in my opinion, the species came to be described, and how it arose that Marshall was

the first to describe it, and why he should have described it as " *nothus* Reinhard MS." I submit, therefore, it is quite clear that Bignell, having bred a variety of specimens, sent these specimens to Fitch for naming, and that Fitch, being unable to name certain of them, made up a parcel and sent it to Reinhard, for Fitch in his short paper in 1881 refers, under *nothus*, to material bred by Bignell, and, further, states categorically that " nearly all the MICROGASTERIDAE . . . are named by Dr. H. Reinhard, of Dresden." It was, also, clearly with Fitch with whom Reinhard was in communication over this matter of the new species *nothus*, for in Bignell's register, against his serial number 88, is this pencil note—" Reinhard's letter to Fitch—88—nothus "; and there is a card so numbered in the Fitch Collection, found by me under *nothus*, but no card with such a number in Bignell's collection. But what is not clear is why Reinhard published no description of the species; but it is obvious that either Reinhard, Marshall, Bignell, Bridgman, or Fitch, determined, or misdetermined, as *nothus* various series bred by Bignell, and that Marshall when he described the species for his work of 1885 had before him one, some, or all of these series so named, and that his description was certainly not necessarily drawn up from material that had been examined and named by Reinhard.

Marshall originally described the species in 1885 from both sexes, but without giving any indication whatever as to what material he had before him, beyond stating that the species was " discovered and bred in some numbers by Bignell from *Anticlea badiata*. . . ." In the British Museum (Marshall Collection) are four specimens, two (together on a card) being labelled as type, but none of them with any indication as to their source. I am recommending nevertheless that one of these four specimens should be accepted as the type of the species, if only since there was no other material from the Marshall Collection under this name, and since this material agrees sufficiently with his description: and I have indicated with a cross on the card the best female specimen of the four.

But, nevertheless, there is some evidence to show what was the source of these four specimens; admittedly slender evidence, but significant. It is as follows:—Of the various cardfuls that were standing in the Bignell Collection under the name *nothus*, one has written on the reverse side " Ap. nothus—from badiata ", and another bears the serial number 724 by which one may see in the register that these specimens also had been determined as *nothus* and also bred from *badiata*: and these two lots are quite clearly conspecific. But against the serial number 724, in the column for observations, after the name of the host, is the figure 16, enclosed in brackets. This surely must refer to the number of specimens bred at this time. If this is accepted, and, further, if one assumes that the two cardfuls referred to above are part of the same series, which seems to me to be a reasonable assumption, it will be seen that the series lacks four specimens. The four in the British Museum, clearly conspecific with all the others that we are discussing, have the appearance of being Bignell material. Why should they not be the four specimens that are missing? To me, this argument is altogether satisfactory, especially as the serial number 724 is dated 1882, that is to say, some three years before Marshall published on the species.

The other material under the name *nothus* that I found in the various collections calls for some remarks. I will first deal with that which I have accepted as, and definitely is, *nothus*. Of the two cards in the Bridgman Collection numbered 752, one has at the extreme bottom right-hand corner the figure 9 (in print), and the other at the extreme bottom left-hand corner the figure 6 (also in print). These cards in Bridgman's register are recorded as " Apanteles nothus. Bignell 1885 ", and they are unquestionably of the same series as

those on the Bignell card in Fitch's Collection numbered 96, despite the date of this latter in the register, namely 1881. Of this series, Bignell records in his register that he bred ten specimens—so two are missing. The Bignell card in the Fitch Collection numbered 239 is easily associated with the card numbered 239 in the Bignell Collection. The Bignell card in the Fitch Collection numbered 125 originally had mounted on it eight specimens; I have no other specimens that can be associated with this series, however, despite Bignell's record to the effect that this series originally comprised twenty-two individuals. Of the material that I am unable to accept as *nothus*, firstly, there was a card of four, much damaged specimens in the Fitch Collection, a card which had originally held six specimens, and which bears the Bignell serial number 163. This is the series recorded from *A. menthastri*, but the *Apanteles* is in too bad a condition to determine. Then, there was another card in the Fitch Collection. This bears two specimens only, instead of the original four. It is the card numbered 88 to which reference has previously been made in this commentary. This series, which is recorded by Bignell to have been bred from *T. retusa*, is unquestionably not *nothus*, but, as might be expected, *A. brevicornis* Wesm. The remaining card that was in the Fitch Collection under *nothus* is labelled to have been bred from *Melanippe galiata* : the material is in such bad condition, however, that I am unable to decide whether or not to accept it as *nothus*. There remain to be dealt with two cards in the Bignell Collection. One is numbered 3297, by which it is shown that the four specimens upon it were bred from *Ino geryon* in 1886; the parasites are not referable to *nothus*, however, but to *geryonis* Marsh., again as might be expected. The other card, which is not numbered, bears one specimen, and is labelled " from furze. 8.vii.85 ". This specimen is quite clearly referable to *circumscriptus* Nees.

Lyle, on page 251 of his paper of 1916, refers to *nothus* three specimens bred from *Phigalia pedaria*. These specimens, which are before me as I write (ser. no. 1348), are not referable to *nothus*. On the other hand, the specimens on the card serial number 4681, which are quite obviously referable to *nothus* and which have been included by me in my redescription, had previously been determined by Lyle as *gracilis* Curtis, but have not, I think, been referred to by him in print.

Finally, it should perhaps also be noted that the Wagner series from Borstel (referred to above) is labelled as having been determined by Konow as *tetricus* Reinh.

Apanteles gabrielis G. & R.

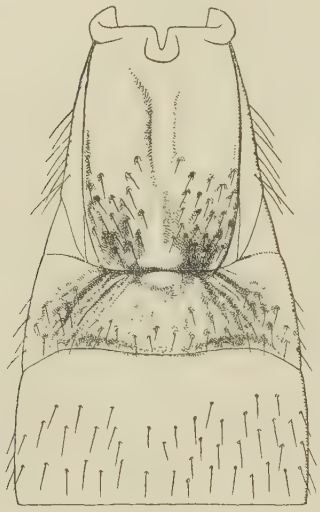
Apanteles gabrielis Gautier & Riel, 1919, *Bull. Soc. ent. France* **1919** : 309–312; 1925, *Bull. Soc. ent. France* **1925** : 167–170. Zorin, 1925, Defense des Plantes, *Bull. Bur. Congrès Ent.—Phytopath.* Russie **2** : 138–147.

Apanteles picipes Bouché, Lyle, 1916, *Entomologist* **49** : 254. Miles, 1927, *Trans. Lincoln. Nat. Union* **1926** : 142; 1931, *N.-West. Naturalist* **6** : 205–206. Goidanich, 1931, *Boll. Lab. ent. Bologna* **4** : 142. Wilkinson, 1931, *Bull. ent. Research* **22** : 76.

Apanteles astrarches Marshall, Faure, 1925, *Rev. Path. Veg. Ent. agric.* **12** : 302–305.

♀♂. Black; apical third of front femora, front tibiae wholly, front and middle tarsi (save for darkened apical segment and feet), extreme apex of middle femora, middle tibiae (save for darkening in the apical half), hind tibiae throughout basal three-fifths, and hind tarsi extensively, red testaceous; palpi and tibial spurs pale; wings hyaline or perhaps very faintly infumated evenly throughout, apparently the setae of the fore-wings coloured and of the hind-wings colourless; stigma, 1st abscissa of radial, and transverse cubital, brown, the metacarp commonly also brown but as commonly rather paler, and large portions of the costal veins often brown but otherwise red testaceous, the majority of the remaining veins much paler or even colourless; stigma uniformly opaque.

♀♂. *Head*: face and clypeus with rather closely placed, minute (degree 1) punctation; frons, frontal orbits, and vertex, minutely punctate (degree 1); facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli about equidistant from each other and the eyes; flagellum of ♀ shorter than combined length of thorax and abdomen, of ♂ longer than combined length of head, thorax, and abdomen, but shorter than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum



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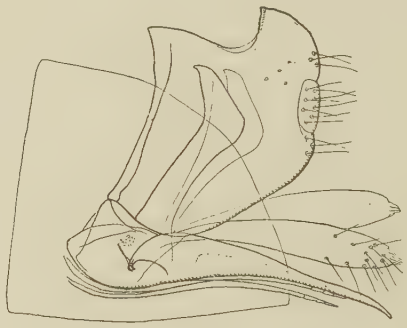

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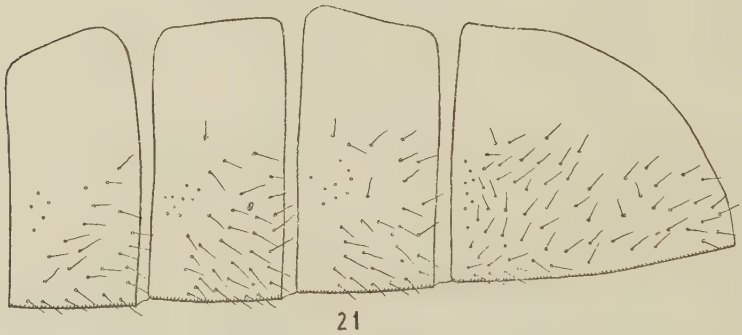

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Fig. 19.—*Apanteles gabrielis* G. & R.; basal tergites, ♀.

Figs. 20 & 21.—*Apanteles gabrielis* G. & R.: 20, genitalia, ♀; 21, apical ventrites, ♀.

punctate (degree 3), the punctures closely placed, or even sometimes more or less coalescent, and not always well defined; disc of scutellum with well-separated, exceedingly minute punctation; propodeon with its apical angles highly shining and more or less entirely smooth, otherwise with much carinulation radiating from a well-marked median apical lunule, and in addition often, but far from invariably, with weak or even sometimes quite well-formed transverse basal carinae. *Legs*: hind coxae basally above punctate (degree 3), otherwise above and on outer faces with well-separated minute punctation (degree 1); hind tibial spurs equal in length, half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 19, 20 and 21): 1st tergite weakly excavate and smooth in the basal half,

regularly turned over, in the apical half or two-fifths punctate (degree 2 and 3), the punctures not always well defined but sometimes coalescent, sometimes obsolete; 2nd tergite minutely, indefinitely sculptured and with some minute punctation (degree 1), its discal sulci broad, deep, and much in evidence, but not clearly delimited, and its apex more or less bisinuate; 3rd tergite highly shining, entirely smooth broadly across base and narrowly across apex, otherwise with more or less regularly placed, well-separated, minute punctation; succeeding tergites with the usual minute punctation; ventrites without median longitudinal suture; ovipositor sheaths shorter than basal segment, about equal to combined length of the 2nd and 3rd segments, the ovipositor longer than the basal segment, equal to or just longer than combined length of the 2nd, 3rd, and 4th segments, of the hind tarsus; hypopygium truncate at apex, or just slightly cut away.

Length, 2·0–2·75 mm.

Redescribed from the following material:—British Museum: Heston, Middlesex, 4 ♀♀, 1 ♂, 3.vii.1920 (*H. Hargreaves*), det. Lyle as *picipes* Bouché; Paris, France, 1 ♀, 1 ♂, ser. no. 2941, *undated* (*A. M. Vance*), det. Wilkinson as *picipes* Bouché; Lyle Collection, New Forest, 1 ♂, reg. no. 2690, 8.v.1915, 1 ♂, reg. no. 2718, 19.v.1915, a card of eleven (3 ♀♀, 8 ♂♂), reg. no. 2791, 29.vii.1915 (*G. T. Lyle*), all det. Lyle as *picipes* Bouché. Dr. Gautier's Collection: Monplaisir, Lyon, 3 ♂♂ (one the *type*), vi.–vii.1919. Stored Products Research Laboratory, Slough: Slough, 1 ♀, 3 ♂♂, 15.xii., 17.xii., no. 1336, 1 ♀, 17.ii.1934, no. 1339, 1 ♂, 2.ii., no. 1514, 1 ♀, *undated*, no. 1548, 1 ♂, 17.ii.1934, no. 1690, 2 ♀♀, 17.ii.1934, no. 1692, 1 ♂, 2.ii., no. 1856, 1 ♂, 27.i.1934, no. 1919, 1 ♂, 17.ii.1934, no. 1959, 2 ♂♂, 9.vi., 10.vi., no. 3727 1 ♂, no. 3721A, all det. Richards as *picipes* Bouché Lyle; Slough, Bucks, 93 ♀♀, 37 ♂♂, 6.vi.1936 (*O. W. Richards*). D. S. Wilkinson's Collection: Bexley, Kent, 10 ♀♀, 4 ♂♂, coll. 9.vii.1937, em. 17.vii.1937 (*R. L. E. Ford*).

Type in Dr. Gautier's Collection.

Host. This species was originally described, and subsequently redescribed, as a gregarious parasite of the Pyralid *Pionea forficalis* L. on cabbage; and from this host, on cabbage, are recorded the series from Slough numbers 1336, 1339, 1919, 1959, 1690, and 1692, while from this host, without reference to the host-plant, is recorded all the material from the Lyle Collection and the material collected by Ford in Bexley. The long series bred by Richards in June 1936 is recorded merely as parasitic on a species of *Pionea*, the series from Heston as possibly parasitic on a species of *Pionea*, the cocoons having been taken on a post near cabbage, the male from Slough no. 1519 from a young larva of a species of *Pionea*, on cabbage, and the male from Slough no. 1856 from a young larva of a species of *Pionea*, on horseradish. The pair from Paris, as I recorded in 1931 under the name *picipes* Bouché, was bred by Vance from the Pyralid *Pyrausta nubilalis* Hübn., and the two males from Slough no. 3727 and the single male no. 3721A from, respectively, a half-grown and a three-quarter-grown larva of the Pyralid *Evergestis straminalis* Hübn. Finally, the single female no. 1548 is recorded from a group of cocoons on cabbage.

In the literature, by far the most notable contribution to our knowledge of this species is the paper by Zorin (1925), who studies in some considerable detail the biology of this parasite, which was very common in the kitchen gardens of Leningrad and Peterhof on all stages of larvae of *P. forficalis*. The author states that the Braconid hibernates as a mature larva in its cocoon, and that in Northern Russia under natural conditions there is as a general rule only one complete generation in the year. He makes a variety of further interesting observations, stating, *inter alia*, that unfertilised females are capable of laying

eggs that develop normally, but that under such conditions only males are ultimately produced; that as many as 488 eggs were dissected out by himself from the ovaries of a large fertilised female; that ten or eleven eggs were found by him to be the average number laid in older host larvae; and that by means of a little stem at their end the ends are sometimes fixed to the internal organs of the host larva, but that usually they float freely in the body fluid. He determined also that larvae of *gabrielis* undergo three instars. These he describes and figures, and states that the larva of the 3rd instar does not remain inside the body of its host, but immediately tears its way out and spins its cocoon. Zorin remarks, finally, that he was unable to determine whether *gabrielis* has an alternative host, but that in any case such a host was unnecessary. Gautier & Riel, in their original description, also remark that they never found more than twelve eggs in each host larva; but it would seem that in France there are two generations a year, for they say " nous avons trouvé la chenille de *Pionea forficalis* et *Apanteles gabrielis* en juin–juillet et en septembre–octobre." Lyle (1916), under the name *picipes*, also states that this *Apanteles* is a not uncommon parasite of *P. forficalis*, that he has bred it in May and July, and that he has obtained broods of up to thirteen individuals. Miles (1931), in a paper on *P. forficalis*, has also written on this parasite, also under the name *picipes*; and some little while ago I saw his material. This latter author states unequivocally that both host and parasite are double-brooded. Other references to *gabrielis* are those by Meier (1927), who gives *P. forficalis* as the host, and Goidanich (1931), who, under the name *picipes*, merely refers to my own record of 1931 of *P. nubilalis*. Finally, Faure (1925) records *P. forficalis* as a host of this *Apanteles*, which he refers to under the name *astrarches* Marsh.

Cocoons white. As Zorin (1925) has correctly pointed out, cocoons are to be found either on the leaves of the host-plant or on debris at the foot of the plant, or in the soil, depending upon the stage of development of the host at the time the parasite was ready to spin. Lyle (1916) merely says the cocoons are constructed within the earthen cocoon made by the host beneath the surface of the ground, which is but a half-truth; Miles (1931) says that the 2nd brood of the parasite thus passes the winter.

Commentary. Gautier & Riel originally described their *gabrielis* from an unstated but apparently considerable number of examples of sex unstated, and as a gregarious parasite of *Pionea forficalis* L. attacking cabbage in 1919 at Monplaisir, a suburb of Lyon, the larva of the host and the *Apanteles* being found in June–July and in September–October; and in 1925 they redescribed their species from both the female and the male. On my making some enquiries. Dr. Gautier was so good as to send me for examination the three male specimens to which I haye referred above and which are labelled " *Apanteles gabrielis*, de *Pionea forficalis* sur *Brassica oleracea*, Lyon, Monplaisir, Juin-Juillet 1919 "; and in his covering letter to me he says : " J'ai bien reçu vos deux lettres et je vais vous envoyer . . . les seuls exemplaires qui nous restent d'*Ap. Gabrielis* ". These three specimens are obviously to be accepted therefore as part and the remains of the original material; and I am selecting one as the type and so labelling it. They are all in extremely bad condition, but happily are still recognisable, and they agree perfectly and in the minutest detail with all the other material of the species from which I have made my redescription.

Faure (1925), after long discussion and without examining Marshall's original material, sank *gabrielis* under *astrarches*; but, of course, this synonymy is incorrect.

Apanteles limbatus Marsh.

Apanteles limbatus Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 173; 1888, *Spécies Hymen. d'Eur.* **4** : 416. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 670. Lyle, 1916, *Entomologist* **49** : 208. Hodgson, 1917, *Trans. Devon. Assoc. Adv. Sci.* **49** : 408. Jackson, 1934, *Scot. Nat.* **1934** : 144; 1935, *loc. cit.* **1935** : 91.

♀♂. Black; in pale examples the four anterior legs (except for their black coxae and darkened feet), the hind trochanters and trochantines, the hind femora (except apically), and the hind tibiae (except for some darkening in apical fourth), red testaceous; but the colouring is extremely variable so that in dark examples the trochanters (but not the trochantines) and feet and apical tarsal joint of the four anterior legs may be black, with often some darkening basally on the front femora, and some considerable darkening throughout the middle femora and apical half of the middle tibiae, while the hind trochanters (but apparently not the hind trochantines), apical half of the hind tibiae, and the hind tarsi, may also be black, and the hind femora entirely black save for a touch of red testaceous colouring at extreme base below; other examples exhibit varying degrees of extent and strength of colouring intermediate between the two extremes described above; palpi and tibial spurs pale, or perhaps slightly red testaceous; wings faintly, but distinctly, infumated evenly throughout, the setae coloured; wing-veins, stigma, and metacarp, brown, the costal veins more testaceous basally; stigma uniformly opaque.

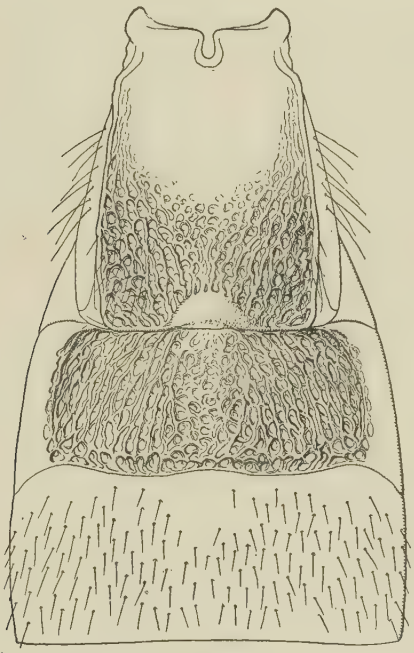

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Fig. 22.—*Apanteles limbatus* Marshall; basal tergites, ♀.

♀♂. *Head*: face punctate (degree 3), the punctures rather closely placed and sometimes even giving the appearance of minute rugosity; the face medianly, shortly below the insertion of the antennae, with an obsolete protuberance; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli

perhaps just nearer to each other rather than equidistant from each other and the eyes; flagellum of ♀ equal to the combined length of head, thorax, and abdomen, of ♂ both stronger and longer than in ♀, being equal to or rather longer than the combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum closely punctate (degrees 3 and 4), the lines of the notauli, and the large area in the posterior half into which they lead, minutely rugose; scutellar sulcus strong, deep, curved, with about ten strong crenulations; disc of scutellum throughout with shallow punctures (degree 3) which

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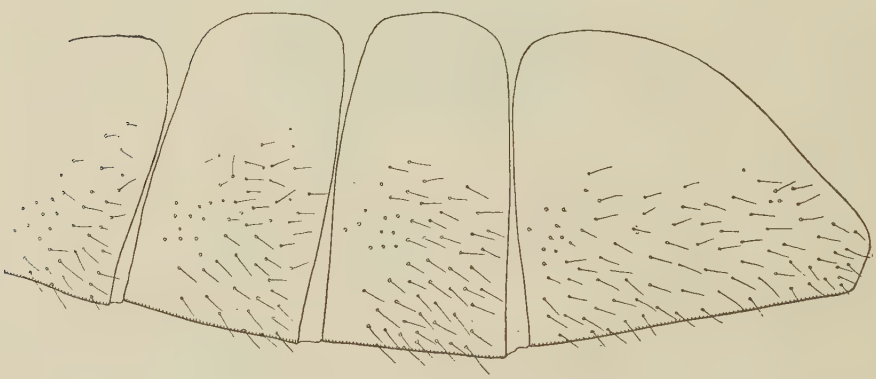

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FIGS. 23 & 24.—*Apanteles limbatus* Marshall: 23, genitalia, ♀; 24, apical ventrites, ♀.

do not seem to be so closely placed as those of the mesonotum; propodeon with a distinct median longitudinal depression, and, in addition to the more or less irregular reticulate carination which makes the propodeon more or less rugose, often with quite well-marked transverse basal carinae. *Legs*: hind coxae basally above throughout strongly and closely punctate (degree 4), on outer faces throughout punctate but more weakly (degree 3) and more sparsely, apically above longitudinally aciculate and striate; hind tibial spurs subequal, the longer spur nearly, if not quite, two-thirds the length of the basal joint of the hind tarsus. *Abdomen* (figs. 22, 23 and 24): 1st tergite in the basal half excavate, smooth and shining, with weak aciculation laterally, in the apical half turned over and rugose;

2nd tergite rugose, possibly rather more finely so than the apical half of the 1st tergite; 2nd suture well marked; 3rd tergite smooth and shining, with regular, minute punctation (degree 2) throughout, save narrowly across base and apex and in a small median basal area; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; ovipositor sheaths much shorter than basal segment, about equal to the combined length of the 3rd and 4th segments, the ovipositor equal in length to the basal segment, of the hind tarsus; hypopygium with its posterior angle cut away to form a short lower-posterior margin.

Length, 2·5–3·0 mm.; an occasional abnormal specimen of 2 mm., or even rather less.

Redescribed from the following material :—British Museum : Acton, 7 ♀♀, 1 ♂, 25.v.1908 (*C.W.*); Farnham House Laboratory, 2 ♀♀, 10.v.1932 (*S. Garthside*); Marshall Collection, a card of three (3 ♀♀), unlabelled; Lyle Collection, a card of four (3 ♀♀, 1 ♂) and a card of three (2 ♀♀, 1 ♂), Kent, ser. no. 1,000 and 1,001 (*C. W. Colthrup*), a card of three (1 ♀, 2 ♂♂), New Forest, 28.v.1911, ser. no. 1,238 (*Cheshire*), a card of nine (2 ♀♀, 7 ♂♂), Wandsworth, 14.v.1914, ser. no. 2,523, and a card of six (5 ♀♀, 1 ♂), Birkdale, Lancs, 9.vi.1925, ser. no. 4870. Bignell Collection : a card of six (6 ♀♀), ser. no. 757, and a card of two (1 ♀, 1 ♂), ser. no. 1,764. Fitch Collection : a card of five (2 ♀♀, 3 ♂♂), Bignell ser. no. 1,764. Bridgman Collection : a card of four (4 ♂♂), unlabelled. Zoologisches Museum der Universität, Berlin : 3 ♀♀, xi.1899 (*Ude*). Imperial Institute of Entomology : Scotland, 1 ♀, 10.vii.1933 (*Miss D. J. Jackson*) : Strathkinnes, Fife, 3 ♀♀, 11–15.vi.1934; Scotland, St. Andrews, 6 ♀♀, 14.vi.1935, 1 ♀, 1 ♂, 22.vi.1935 (*Miss D. J. Jackson*), Strathkinnes, 25 ♀♀, 28 ♂♂, 23.vii.1935 (*Miss D. J. Jackson*); Slough, Buckinghamshire, two cards, of six (5 ♀♀, 1 ♂) and seven (4 ♀♀, 3 ♂♂), 22.vi.–9.vii.1935, ser. nos. 36710, 36711 (*O. W. Richards*); Clapham, London, a card of ten (7 ♀♀, 3 ♂♂), v.1933 (*O. Tassart*); 3 ♀♀, 26.v.1911, 27.v.1911, ser. no. W9 (*Kerrich*).

Type in the Plymouth Municipal Museum.

Host. This species was originally described from the Geometrid *Abraxas grossulariata* L., and was recorded from this host by Bignell also, whose material it was ; and all the material from which I have redescribed this *Apanteles* was bred from this host, with the exception of the three females in the Marshall Collection, the two series with the Bignell serial number 1764, the four males in the Bridgman Collection, and the cardful of ten bred by Tassart, which are without any host record, and the three females from Germany, which are recorded from *Abraxas sylvata* Scop.

Although I have not seen his material, and although he made no mention of *limbatus* Marsh., I consider also that Picard (1914) was referring to this species when he wrote on the " Insectes du Groseillier et du Frambroisier." Lyle states that *limbatus* is a common parasite of *grossulariata*.

Cocoons white, with the faintest tinge of lemon colour, gregarious, loosely held together in small masses.

Commentary. Marshall originally described this species " from 14 specimens bred by Bignell : six females from *Abraxas grossulariata* L., and the rest from unrecorded larvae, seven being males." Bignell himself, when publishing his records in 1901, seems to have mislaid a specimen : he also words the record somewhat differently, and says " Bred from *Abraxas grossulariata*, 2 July, 1880, and 14 July, 1882, seven males from one and six females from the other." As I have recorded above, in the list of material from which I have redescribed the species, there are two cardfuls in the Bignell Collection and one in the Fitch Collection. One of the two cards in Bignell's Collection, namely that with

serial number 757, bears six females, which from Bignell's register are recorded to have been bred on 14 July 1882 from *A. grossulariata*. The other card of Bignell's has two specimens (1 ♀, 1 ♂) and bears his serial number 1764 : and this serial number is also borne by Fitch's card. which has five specimens (2 ♀♀, 3 ♂♂). From Bignell's register it may be seen that these latter seven specimens were bred on 2 July 1880, and are definitely without host record; and I am convinced that they are the rest of the 14 specimens, the cardful of six being quite obviously the original six females.

I am naturally selecting this cardful of six females as the type series, not only because of the definite host record but also because this material was the first to be mentioned by Marshall in his description : and whoever it was that labelled up Bignell's Collection with type-labels apparently had the same idea as myself, since a type-label had been already affixed to this card. A type-label was also on the cardful of three in the Marshall Collection in the British Museum : but of course this is absurd, if only because there is absolutely no information to show the source of this material.

With further regard to the material on the cards numbered 1764, I should remark that, in his register, Bignell has written against this number " Apanteles limbatus, n.sp ", while both the cards bear this same information. I am not greatly concerned as to the discrepancies in the numbers of the sexes, while, as to the exact number of specimens being one shorter than as described by Marshall, I would point out that the card of two in the Bignell Collection has quite obviously been cut down, the written label stuck on the bottom of the card lacking some letters. It is quite possible that Bignell himself sent a specimen to Bridgman, and then forgot he had done so : this is borne out by a card of cocoons in the Bridgman Collection standing under the name *limbatus* that has the number 1764 on it, in ink, and erased in ink, with on the underside a hieroglyphic with the note " 2 cards ", a note and hieroglyphic which the Bignell card has also. The source of the four specimens in the Bridgman Collection is unknown.

Further material examined :—

D. S. Wilkinson's Collection : Yarmouth, Isle of Wight, 7 ♀♀, 5 ♂♂, pup. iv.1937, em. v.1937 (*R. L. E. Ford*).

Imperial Institute of Entomology : St. Andrews, Scotland, 1 ♂, vi.–vii.1936, 1 ♂, 26.v.1936, 6 ♀♀, 4 ♂♂, 1936 (*Miss D. J. Jackson*); Reading, Berks, 29 ♀♀, 15 ♂♂, 1936 (*H. L. Dalton*).

Oxford University Museum : 1 ♂, June 1914.

All above ex *Abraxas grossulariata*.

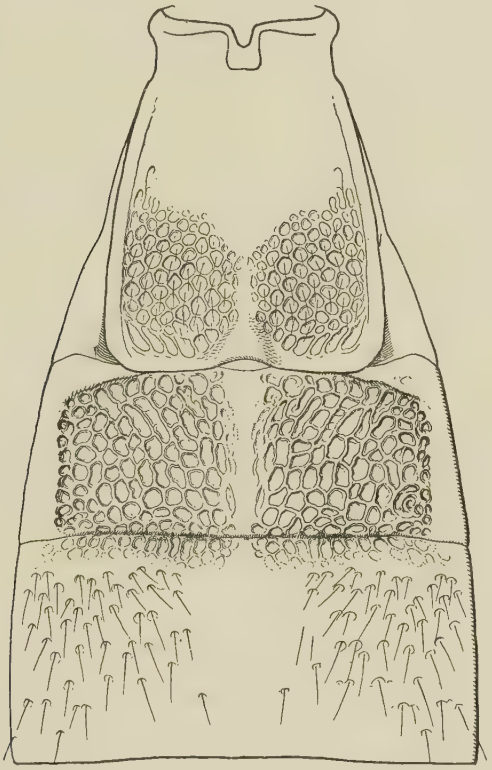
Apanteles rubripes Hal.

Microgaster rubripes Haliday, 1834, *Ent. Mag.* **2** : 253. *Apanteles rubripes* Haliday, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 174; 1888, *Spécies Hymen. d'Eur.* **4** : 418.
Microgaster glomeratus Linné, Curtis, 1830, *Brit. Entom.* **7** : no 321; Haliday, 1834, *Ent. Mag.* **2** : 253.

♀♂. Black; palpi, the anterior legs (save for their coxae), the hind trochanters and trochantines, the hind femora (except that they are tipped with black at their extreme apices), and the hind tibiae, red testaceous; hind tarsi, and apices of hind tibiae more or less darkened (in some individuals obviously darkened, and in others almost imperceptibly so); tibial spurs pale; wings hyaline; stigma, metacarp, radial and transverse cubital veins, and apex of the costal veins, brown; the remaining veins light brown, but, as the base of the wing is approached, almost entirely without pigmentation.

♀♂. *Head* : face regularly, minutely punctate (degree 2), as are the frons and vertex

but more weakly and more widely; facial depressions large, nearer to apex of clypeus than to the eyes; antennae of ♀ as long as, and of ♂ longer than, combined length of head, thorax, and abdomen. *Thorax*: mesonotum reticulately punctate (degree 4) all along the lines of the notauli and on the broad posterior area into which the notauli lead (but the punctures not very deep), elsewhere more weakly punctate (degree 3 or 3–4), with the punctures still shallower and more widely spaced but still fairly close, in places so shallow as to be obsolete; narrowly right across immediately anteriorly to the scutellar sulcus, and a little way up beyond on each side, the mesonotum is smooth and shining with some only exceedingly



25

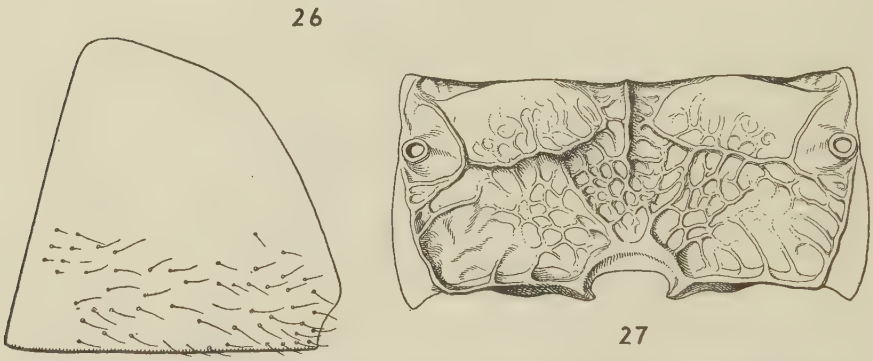
Fig. 25.—*Apanteles rubripes* Haliday; basal tergites, ♀.

minute punctures (degree 1); scutellar sulcus well marked, deep, regularly curved, with ten crenulations; the disc of the scutellum throughout with broad, shallow, almost obsolete punctures (degrees 3 or 3–4), in certain lights even appearing almost smooth; the lower, non-excavate area of the lateral faces of the scutellum not large nor produced upwards; propodeon in each lateral basal half with a strong carina (or group of rugosities in the form of a carina) running transversely and slightly obliquely from near the medial point of the base to below the spiracles; there is also a median longitudinal carina which is often quite strong in the basal third, but which is invariably weak apically where it becomes lost amongst the well-marked (but not strong), reticulate rugulosities of the median apical third, of the propodeon; the propodeon basally to the transverse carinae, and in the lateral thirds of the apical half, almost without sculpture. Venation rather variable, the 1st abscissa of

the radial being either definitely longer than (as in the ♂ from the Curtis Collection), or equal to, the transverse cubital. *Legs*: hind coxae above reticulately punctate (degree 4), on outer faces smooth with widely spaced, distinct punctures (degree 2–3); the longer hind tibial spur three-fifths, and the shorter spur one-half, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 25, 26 and 27): 1st tergite excavate and smooth in the basal half, coarsely rugosely punctate in the apical half, which is turned over, save that right across the extreme apex the tergite is smooth (or at most with indefinite aciculation) with an entirely smooth median apical, raised, shining lunule; 2nd tergite rugose, with its sulci very weak; 2nd suture very well marked; 3rd tergite longer than 2nd (17 : 14), smooth save for at least four transverse rows of minute setiferous punctures (degree 1) which in certain lights, and particularly in the basal lateral thirds (or at least the basal angles), commonly give to the integument the appearance of being indefinitely rugulose; succeeding tergites with only the usual minute punctation; lower posterior angle of hypopygium sharply cut away; ovipositor sheaths short.

Length, 3 mm.

Redescribed from the following material :—Curtis Collection, Australia, 1 ♂. British Museum : Marshall Collection, a card of 2 ♀♀, 3 ♂♂, from Bignell,



Figs. 26 & 27.—*Apanteles rubripes* Haliday : 26, apical ventrite, ♀; 27, propodeum, ♀.

17.vii.1882, numbered 775; Lyle Collection, a card of 2 ♀♀, 4 ♂♂, numbered 5123, Mildenhall, vi.1927 (*Graham Smith*). Bignell Collection : a card of 6 ♀♀, numbered 775, 17.vii.1882, and a card of 2 ♀♀, numbered 1755 but without further data (in Bignell's Register the date is given as 1.vii.1880). Fitch Collection : a card of 3 ♀♀, 2 ♂♂, from Bignell, 1.vii.1880, numbered 744a, a card of 6 ♀♀, 8 ♂♂, 1882 (*Raynor*), and a card of 8 ♀♀ (*Harding*).

Type presumably in the Melbourne Museum, Australia (see below).

Host. The type series was bred from the Geometrid moth, *Hipparchus papilionarius* L., the Large Emerald. All the material mentioned above was also bred from this host, except Harding's 8 females in the Fitch Collection, which were bred from the Nymphalid butterfly, *Vanessa*, now *Aglais*, *urticae* L. Marshall also records that Cameron bred this species from the butterfly *Pieris brassicae* L., but I have not seen his material.

Cocoons sulphur-yellow, irregularly clustered.

Commentary. Haliday described his species, from the female only, from the Curtis Collection (" Mus. J. Curtis "), taking as his material an unstated number of specimens (probably all) of Curtis' *glomeratus*, this latter author having misidentified as *glomeratus* the parasite he had bred from *Hipparchus papilio-*

narius. Curtis bred twenty or thirty of his *glomeratus*, and yet there were only five specimens standing above the name of *rubripes* in his collection in Australia.

Of these five specimens, three were kindly loaned to me for examination; and I found they represented three quite distinct species. With two of these specimens, therefore, I am obviously not further concerned. On the other hand, the third, a male, not only agrees with Haliday's description (save that its tergites are not rufous, but darkened, thus agreeing with Marshall's description), but what is very much more important, it agrees absolutely perfectly with various other material bred from the same host and determined as *rubripes* by Marshall, Reinhard, and Lyle; and on this score I propose, and I think rightly, to accept this interpretation of the species.

The Curtis male that I have before me cannot, most unfortunately, be labelled as the type, since *rubripes* was described by Haliday from the female only.

Marshall states that "four broods by Bignell and another by Raynor" were named by Reinhard; the card of 5 ♀♂ from the Bignell Collection referred to above has the following label :—"*A. rubripes* Rhd.".

I am extremely doubtful as to the correct determination of the cardful of 8 specimens in the Fitch Collection bred from *V. urticae*. But, in addition to an unsatisfactory general facies, I have found only two minor characters in which this series differs from the others : there are no setae on the 3rd tergite, and the hind coxae above are but weakly punctate, or at most with some strong punctures basally above.

Apanteles ordinarius Ratz.

Microgaster ordinarius Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 71; 1848, **2** : 52; 1852, **3** : 54.
Apanteles ordinarius Ratzeburg, Reinhard, 1880, *Deuts. ent. Z.* **24** : 368. Watanabe, 1932, *Ins. Matsumura.* **7** : 79.
Apanteles dendrolimi Matsumura, 1926, *Ann. Mus. Zool. Acad. Sci. U.R.S.S.* **26** : 40.
Apanteles dendrolimusi Matsumura, 1926, *J. Coll. Agric. Hokkaido Imp. Univ.* **18** (1) : 32.

♀♂. Black; the trochantines (but not the trochanters) of all legs, the femora, tibiae, and tarsi of the front legs, middle femora (except all along the top, which is strongly darkened), middle tibiae and tarsi, hind femora (except as further described below), and about the basal three-fifths of the hind tibiae, red testaceous; apical tarsal joint of the four anterior legs distinctly darkened, hind tarsi throughout strongly darkened, and all feet black; the hind femora are black broadly all along the top, in a large area apically, and, in the females sometimes, in the males commonly, broadly all along the bottom; in darker specimens of the male the four anterior femora often exhibit darkening beneath basally; palpi and tibial spurs pale, or perhaps slightly red testaceous; wings faintly, but distinctly, infumated evenly throughout, the setae coloured; wing-veins, stigma, and metacarp, dark brown (in old material, light red-brown), the costal veins more testaceous; stigma uniformly opaque.

♀♂. *Head*: face and clypeus throughout punctate (degree 3); the face medianly, shortly below the insertion of the antennae, with a distinct protuberance; facial depressions rather nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli about equidistant from each other and the eyes; flagellum of ♀ equal to the combined length of head, thorax, and abdomen, of ♂ longer, equal to the combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum strongly punctate (degrees 3, 4, and 5), perhaps rather more strongly so in the ♀ than in the ♂; the lines of the notauli well marked, in their anterior half with the punctures reticulately placed; scutellar sulcus strong, deep, more or less straight, with 8–10 strong crenulations; disc of scutellum throughout weakly (degree 3) and sparsely punctate; propodeon, in addition to the irregular, reticulate carination that makes the propodeon coarsely reticulately rugose, with a median longitudinal carina and transverse basal carinae;

the transverse basal carinae are often composed of two or more carinae heaped together so that the resulting mass is often quite strong (or even very strong) and often even making it appear that the median carina is situate in an impressed area; all this sculpture, however, very variable in strength, even sometimes almost wanting, and the propodeon invariably entirely smooth and shining all across the base in the greater portion of that area basally to the transverse basal carinae and laterally to the median longitudinal carina with its attendant weak rugosity. *Legs*: hind coxae both above and on outer faces regularly punctate throughout, the punctures basally above, however, being more closely placed and

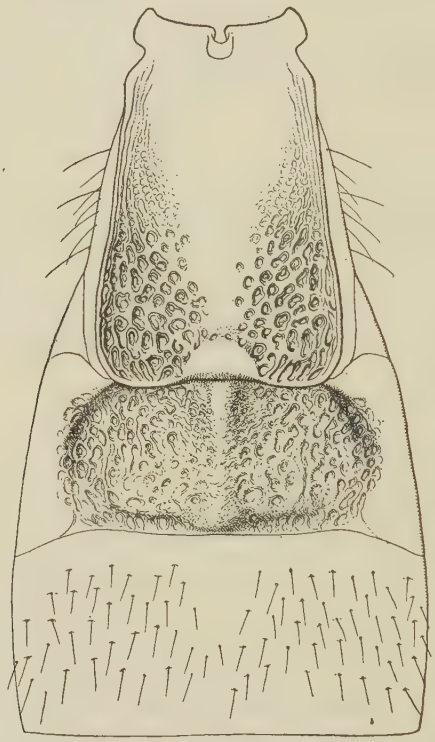


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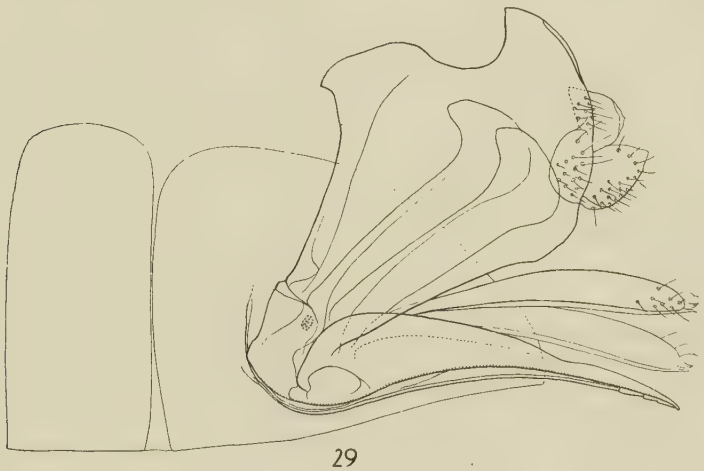
Fig. 28.—*Apanteles ordinarius* Ratz.; basal tergites, ♀.

more deeply impressed (degree 4) than those on the outer faces; hind tibial spurs subequal, the longer spur nearly two-thirds the length of the basal joint of the hind tarsus. *Abdomen* (figs. 28, 29 and 30): 1st tergite rather variable in shape, but on the whole more parallel-sided in the males and more widely distended apically in the females, in both sexes in about the basal two-fifths or half weakly excavate, smooth and shining, with, in the more strongly sculptured specimens, some few very weak aciculations laterally, in about the apical third or two-fifths slightly turned over and strongly, often almost rugosely, punctate (degrees 4 and 5) in at least the lateral thirds but entirely smooth and shining in the medial fifth; 2nd tergite indeterminately sculptured to weakly rugose; 2nd suture well marked; 3rd and succeeding tergites smooth and shining, with regular, widely placed, minute (degree 1) punctation throughout save that the 3rd tergite is noticeably devoid of this punctation broadly right across both base and apex; ventrites of ♀ without median longitudinal suture; ovi-

positor sheaths and the basal joint of the hind tarsus of equal length; hypopygium truncated at extreme apex.

Length, 3·25 mm.

Redescribed from the following material:—Ratzeburg Collection: a pin mounting 3 ♀♀, 1 ♂, unlabelled; 1 ♀, with an almost unreadable label, 1 ♀, "ordinar. v. Hahn". Reinhard Collection: 1 ♀, 1 ♂, unlabelled. British Museum: 1 ♀, Karafuto, S. Kuwayana. Imperial Institute of Entomology:



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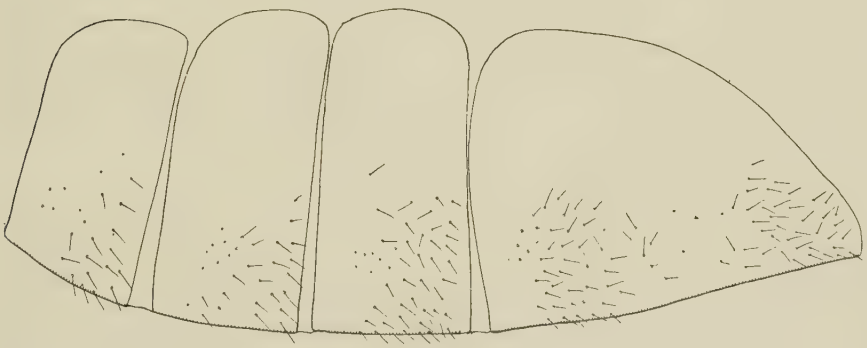

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Figs. 29 & 30.—*Apanteles ordinarius* Ratz.: 29, genitalia, ♀; 30, apical ventrites, ♀.

Germany, Potsdam, Forstamt Lehnin, 27 ♀♀, 28 ♂♂, 1935, Forstamt Woltersdorf, 57 ♀♀, 20 ♂♂, 1935, 27 ♀♀, 12 ♂♂, 1935 (*Dr. Schwerdtfeger*).

Type in the Forstlichen Hochschule, Eberswalde. Location of *type* of *dendrolimi* Mats., and *dendrolimusi* Mats., unknown, presumably Japan.

Host. This species was originally described by Ratzeburg, and again referred to by him in 1848 and 1852, as a common parasite of "der Kiefernspinner-Raupen," the Lasiocampid *Dendrolimus pini* L., a species that has been referred to by many under the following generic names, namely *Lasiocampa*, *Bombyx*, *Metanastria*, and *Lebeda*; and Reinhard also makes the same record.

The long series from Potsdam, from which I have largely redescribed this species, was bred from this host.

Matsumura, when describing his *dendrolimi* and *dendrolimusi*, records *Dendrolimus sibiricus* Tschver., and *D. albolineatus* Mats., to be hosts of this *Apanteles*, over 80% being parasitised in Saghalien. Watanabe, in addition, records the species to have been reared at Sapporo, Japan, from *Dendrolimus spectabilis* Butl. The single Japanese example in the possession of the British Museum was bred from *D. albolineatus* Mats.

Cocoons white, usually (but not always) placed in an orderly row, side by side, along the pine-needles.

Commentary. Ratzeburg originally described *ordinarius* from both sexes, but from an unstated number of individuals, and remarked that the species was a parasite of " Kiefernspinner " and that its cocoons were laid out in regular rows. In the Ratzeburg Collection standing under this name was material mounted on five pins : and all this is before me as I write. The first pin, which was without any label, bears a card, on which are five specimens (4 ♀♀, 1 ♂), and a group of pine-needles, on which are about 20 cocoons laid out in a regular row. This lot I intend to accept as the original series ; and I have labelled it as such, and added the usual type label. My reasons are that the specimens agree perfectly, or at least as well as can be expected, and the arrangement of the cocoons absolutely perfectly, with Ratzeburg's original description, while, in addition, this material is clearly the same species of *Apanteles* as the long series referred to by me above recently bred by Dr. Schwerdtfeger from *D. pini*.

Of the remaining four pins that were under this name in Ratzeburg's collection, the second is labelled in Ratzeburg's handwriting " Microg. ordinar. Brischke ", and bears two specimens that are quite clearly not *ordinarius* Ratz., in that they cannot possibly be made to agree with his description. The third pin is labelled " Microg. recondit. N " (but is almost unreadable), and bears a single female specimen of what is clearly *ordinarius* Ratz., while the fourth pin is unlabelled and bears a small male that might possibly be this species also. The fifth and last pin that was standing under *ordinarius* bears a single female that is clearly this species and is labelled in Ratzeburg's handwriting " ordinar." and, in apparently another writing, " v. Hahn ".

Reinhard, as may be seen from the list of material from which I have drawn up my redescription, succeeded in recognising Ratzeburg's species, probably by means of the host and cocoons : consequently I have referred to Reinhard in the synonymy. Marshall did not know *ordinarius* : I am quite satisfied as to this. He refers to this species three specimens in the Fitch Collection which do not agree either with Ratzeburg's material or description. Two of the Fitch specimens are, admittedly, fairly close to *ordinarius*, but the third is altogether distinct, as noted by Lyle (*Ent. mon. Mag.* **61** : 120–121) in his discussion on his species *cupreus*. Lyle states that the other two " certainly agree with Ratzeburg's description of *ordinarius* " : but, I say, they do not, and neither are these three specimens a male and two females, as Lyle states that they are. Neither are they two males and a female, as Marshall states : but three females. And, in any event, I am at a loss to understand why Lyle should drag in a discussion on *ordinarius*, since his *cupreus* is so widely separated.

I have not examined the type (or types) of *A. dendrolimi* Mats., and *dendrolimusi* Mats., but nevertheless have been able with confidence to synonymise these names under *ordinarius* Ratz., as Watanabe has already done. This has been rendered possible for me on account of the single female specimen, referred to above, from Kuwayana. This specimen, which is quite obviously referable

to *ordinarius*, was lately presented to us, on exchange, by Mr. C. Watanabe, and was determined as *ordinarius* by this Japanese authority, who, in his paper of 1932, sunk under *ordinarius* both of Matsumura's names.

Apanteles affinis Nees.

Microgaster affinis Nees, 1834, *Hym. Ichn. aff. Mon.* **1** : 176–177.
Apanteles affinis Nees, Reinhard, 1880, *Deuts. ent. Z.* **24** : 370. Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 417–418. Watanabe, 1932, *Ins. Matsumura.* **7** : 87–88.
Microgaster vinulae Bouché, 1834, *Nat. Ins.* **1834** : 156–157. Nees, 1834, *Hym. Ichn. aff. Mon.* **2** : 401. Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 72; 1848, **2** : 52; 1852, **3** : 54.
Microgaster euphorbiae Bouché, 1834, *Nat. Ins.* **1834** : 157 (**syn. n.**).

♀♂. Black; legs throughout red testaceous, save that the feet and all coxae are black and the four posterior trochanters commonly much darkened; some darkening at extreme

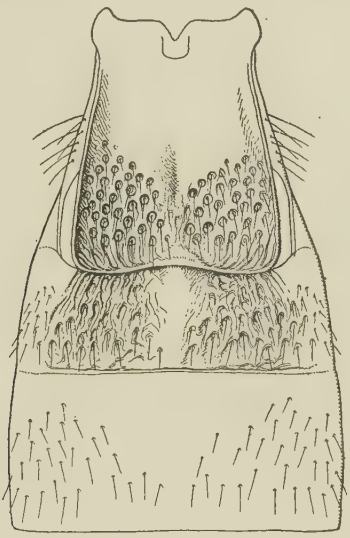

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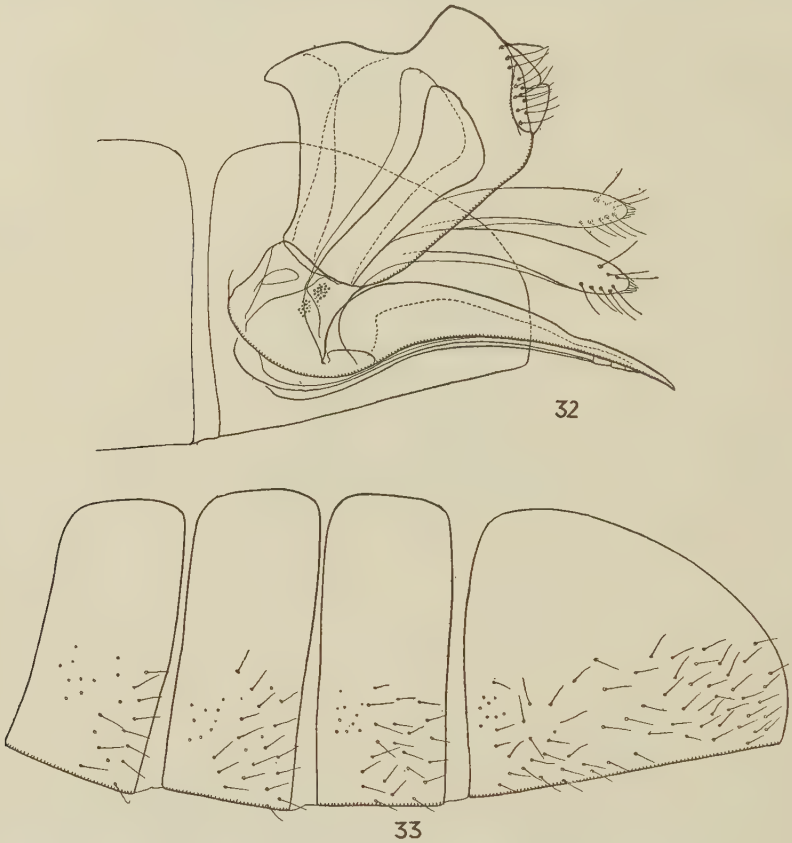
FIG. 31.—*Apanteles affinis* Nees; basal tergites, ♀.

apex above on the hind femora sometimes just noticeable; palpi and tibial spurs pale; scape red testaceous, dark red, or black, and the flagellum brown; wings hyaline, and the setae white; stigma and metacarp light brown; wing-veins very lightly coloured in the centre of the wing, quite colourless basally, the costal veins light red testaceous.

♀♂. *Head*: clypeus, face, frontal orbits, frons, and vertex, throughout with regularly placed, minute (degree 2) punctation; facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ longer than combined length of thorax and abdomen, but shorter than combined length of head, thorax, and abdomen, of ♂ equal to combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout with regularly placed, minute punctation (degree 2 or 3); disc of scutellum minutely punctate (degree 1); propodeon with numerous fine carinae diverging from the median apical lunule, so that medianly and throughout basally the propodeon is finely rugose; the apical lateral areas of the propodeon highly shining, entirely smooth (save perhaps for an occasional carina, or small portion of carina, more widely divergent than usual), and on each side occupying the whole

of the more or less triangular area between the median lunule, the spiracle, and the apical angle; the propodeon medianly in the basal half often distinctly somewhat sunken, or sometimes perhaps more rightly describable as slightly tumescent in the basal half on each side, and when this condition occurs the median longitudinal carina is often (but not always) noticeably stronger than the other carinae arising from the median apical lunule; propodeon distinctly smoother narrowly right across base. *Legs*: hind coxae above and on outer faces minutely punctate (degree 2), basally above with some quite strong punctation (degree 4); hind tibial spurs equal, half the length of the basal joint of the hind tarsus. *Abdomen*



Figs. 32 & 33.—*Apanteles affinis* Nees: 32, genitalia, ♀; 33, apical ventrites, ♀.

(figs. 31, 32 and 33): 1st tergite in basal half excavate, smooth, and shining, in apical half turned over and rugoso-punctate, often weakly, but often with the punctation clearly defined and strong (degree 4); 2nd tergite with weak, almost obsolete, longitudinal sculpture, and without lateral sulci; 3rd tergite in both sexes with at least an irregular row of minute punctures right across in the apical third and with a few such punctures laterally in the basal two-thirds, commonly with an irregular (or double) row of such punctures right across the base of the apical third and with the lateral thirds of the basal two-thirds throughout thus punctate also, but seemingly always devoid of such punctures narrowly right across both extreme base and apex and in a large medial area, the tergite otherwise entirely smooth save for some extremely weak aciculation or obsolete sculpture in a few larger examples; succeeding tergites with minute punctation; ventrites without median longi-

tudinal suture; ovipositor sheaths rather longer than the basal joint, and the ovipositor itself about equal to the combined length of the two basal joints, of the hind tarsus; hypopygium large, strongly rounded apically, but definitely not with its apex cut away to form a small lower-apical margin, but evenly rounded.

Length, 2·5 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a cardful of four (3 ♀♀, 1 ♂), determined as *affinis*; General Collection, Sapporo, Matsumura, Japan, 1 ♀, 1 ♂, 14, 16.vii.1914, det. by Watanabe as *affinis*. Zoologisches Museum der Universität, Berlin: Leipzig, 1 ♀, 1 ♂, viii.1890 (*Dr. R. Krieger*); Rahnsdorf, Berlin, 24 ♀♀, 4 ♂♂, all dated both 12.vii.1903 and 17.vii.1903 (*Dr. G. Enderlein*). Zoologisches Museum, Hamburg: Niederelbe, Boberg, 7 ♀♀, 1 ♂, 20.viii.1925 (*H. Schleicher*). Ratzeburg Collection: 1 ♀, det. as *vinulae* Bouché. Reinhard Collection: 1 ♀ (now the *neotype*), det. as *affinis* Nees. A. C. W. Wagner's Collection: Winsen, 4 ♂♂, 18.viii.1911, Boberg, 1 ♀, 1 ♂, 29.viii.1929, 1 ♀, 27.xi.1929. C. Ferrière's Collection: Estavayer, Switzerland, 70 ♀♀, 3 ♂♂, 1923 (*C. Ferrière*), det. by Ferrière as ? *affinis*.

Further material examined:—Reinhard Collection, 2 ♀♀, 3 ♂♂, det. as *affinis* Nees. Bouché Collection: 1 ♀ (*type*), 1 ♂, remains of Bouché's original material of *vinulae*; 2 ♀♀ (one the *type*), remains of Bouché's original material of *euphorbiae*.

Type of *affinis* Nees is lost: *neotype* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26930. *Type* of both *vinulae* Bouché, and *euphorbiae* Bouché, in the Bouché Collection, Zoologisches Museum der Universität, Berlin; the register serial numbers 13113 and 13108 respectively.

Host. Nees originally described some of his material of his *affinis*, and Bouché all his material of his *vinulae*, to have been bred from the Notodontid *Bombyx*, now *Cerura*, *vinula* L., and from this host either under the generic name *Dicranura* or *Harpyia* is recorded all the material from which I have made my redescription, Ratzeburg in his three volumes, Reinhard, and Watanabe, also record this host.

Reinhard in his description of the species records in addition the Agrotid *Cucullia artemisiae* Hufn., while Bouché originally described his *euphorbiae* as a parasite of the Sphingid *Sphinx*, now *Celerio*, *euphorbiae* L.

Cocoons white, solitary, or if occurring in any number heaped closely together in confusion round the parasitised larva.

Commentary. Nees originally described his *affinis* from apparently three females and one male, this material being comprised of a single female captured by himself, of a female in the Klug Collection "e puppa *Bombycis vinulae* natam", of another, captured, female in the Klug Collection, and of a male captured by Gravenhorst. All the Nees and Gravenhorst material is, of course, lost or unrecognisable: and there is no material in the Klug Collection either named *affinis* or labelled to have been bred from "*Bombyx vinula*".

The first reviser of *affinis* Nees, is Reinhard 1880. This author redescribed Nees's species from an unstated number of both females and males bred "aus *Harp. vinula* und *Cucull. artemisiae*." In the Reinhard Collection under this name are three females and three males, all labelled with a small cross, and one male in addition labelled "a *Bomb. vinula*". This material agrees perfectly with Reinhard's description, and also, which is as important, with Nees's original description, and is quite obviously to be accepted as the series from

which a neotype must be selected; and as may be seen above I have selected a female as the neotype, and so labelled it.

There is no question in my mind but that this series of Reinhard's is the same species that Nees described as *affinis*. Not only do the descriptions agree perfectly, but the host is the same. Reinhard, also, sunk *vinulae* Bouché, under *affinis* Nees; and Reinhard's series, Bouché's material of his species, and all my material bred from *C. vinula* agree together perfectly and in the minutest detail. What I cannot understand, however, is why Nees did not sink *vinulae* Bouché, under his own *affinis*, in the same way that he sunk other of Bouché's species under others of his own: he had every inducement to do so.

Bouché originally described his *vinulae* from an unstated number of specimens of both sexes, and as a parasite of "*Bombyx vinula.*" In the Bouché Collection are a female and a male labelled in the usual manner for this collection, the female with five labels—"Berlin"; the serial number 13113; a red "type" label; the usual Stein label "vinulae Bouch.*"; and with the usual Enderlein label, but in this case "*Apanteles affinis* (Nees)", and the male with two labels only—"Berlin", and a red type label. This material agrees perfectly, or as perfectly as is to be expected, with Bouché's original description, and I am convinced that Stein and Enderlein were correct to accept it as the original material of the species; it agrees, also, perfectly and in the minutest detail, as I have stated above, with all the material I have seen of this species bred from *C. vinula.*

Bouché originally described his *euphorbiae* from an unstated number of specimens of apparently the female sex only, and as a parasite of "*Sphinx euphorbiae.*" In the Bouché Collection are two females labelled in the usual manner for this collection with two labels—"Berlin", and a red type label; one specimen in addition bears the serial number 13108; the usual Stein label "*euphorbiae* Bouch.*"; and an Enderlein label "*Apanteles nigriventris* (Nees)". This material agrees perfectly with Bouché's original description, and I am convinced that Stein and Enderlein were correct to accept it as the original material, if only because it agrees with material of Bouché's *vinulae*, for even Bouché remarked that his *euphorbiae* was very near to *vinulae*. I would remark that these two females agree in the minutest detail—even facies—with all the material above from which I have redescribed Nees's species, despite the hosts being so widely separated. One is inclined to wonder if the host record of *euphorbiae* is correct.

Enderlein determined this material of *euphorbiae* as *nigriventris* since Nees sank *euphorbiae* under this species of his. I am unable to accept Nees's synonymy in this instance, however.

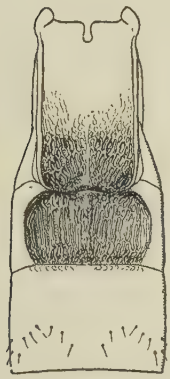
Apanteles brevicornis Wesm.

Microgaster brevicornis Wesmael, 1873, *Nouv. Mém. Acad. Brux.* **10**: 50.
Apanteles cleoceridis Marshall, 1888, *Spécies Hymen. d'Eur.* **4**: 426. Hodgson, 1917, *Trans. Devon. Assoc. Adv. Sci.* **49**: 412 (**syn. n.**).

♀♂. Black; the four anterior tarsi, the front tibiae, at least the apical half of front femora, middle femora at extreme apex, quite the basal two-thirds of the middle tibiae, about the basal half to two-thirds of the hind tibiae, the hind tarsi to some extent, red testaceous; palpi and tibial spurs pale; wings hyaline; the stigma, metacarp, and wing-veins brown; stigma uniformly opaque.

♀♂. *Head* as wide as, or wider than, mesonotum between the tegulae; face throughout with minute (degree 2) punctures, which are distinctly separated; facial depressions rather

nearer to apex of clypeus than to eyes; frons and vertex with exceedingly minute, well-separated punctures; flagellum of ♂ longer than the combined length of head, thorax, and abdomen, of ♀ barely longer than combined length of head and thorax, certainly not longer than combined length of head, thorax, and 1st tergite. *Thorax*: mesonotum with regular, but not widely spaced, minute (degree 2) punctation which is rather variable in strength; disc of scutellum almost entirely smooth and shining, with but a few, exceedingly minute, very widely spaced punctures; scutellar sulcus evenly, slightly rounded, strongly crenulate with about 12–14 cells, the transverse impression of the mesonotum weak; the propodeon



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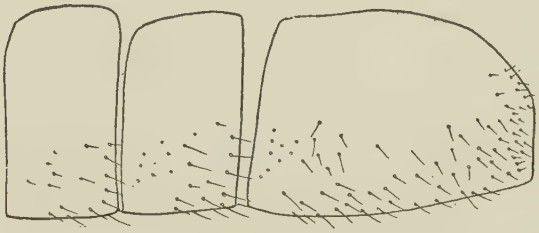

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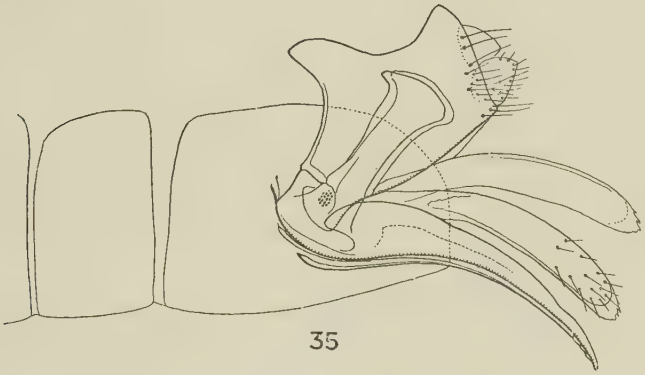

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Fig. 34.—*Apanteles brevicornis* Wesmael; basal tergites, ♀.

Figs. 35 & 36.—*Apanteles brevicornis* Wesmael: 35, genitalia, ♀; 36, apical ventrites, ♀.

almost invariably with a very weak median longitudinal carina, and commonly with very weak transverse basal carinae, otherwise finely and more or less irregularly rugose throughout save for quite a large, quite smooth and shining area across the base on each side from near the middle to the lateral margins and occupying from about one-fifth to one-fourth of the length of the propodeon. Radial and transverse cubital veins always very definitely angled, with their relative lengths variable, more commonly with the latter vein just shorter than the former. *Legs*: hind coxae basally above with some strong punctures (degree 4), on outer faces minutely and sparsely punctate; hind tibial spurs equal, or at least subequal, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 34, 35 and 36): 1st tergite only slightly excavated basally, in about the basal three-fifths smooth more or less

or with some aciculation, about the apical two-fifths turned over and rugose or even longitudinally striato-rugose; 2nd tergite with its disc longitudinally striato-rugose; 2nd suture obsolete to crenulate in the neighbourhood of the sculptured disc; 3rd and succeeding tergites smooth with only exceedingly sparse minute punctation; ovipositor sheaths short; hypopygium truncate, large relatively to the size of the abdomen.

Length, 2·0–2·75 mm.

Redescribed from the following material:—British Museum: Perthshire, Rannoch, 1 ♀, 5–10.vi.1931 (*R. B. Benson*); Lyle Collection, a card of four (3 ♀♀, 1 ♂), numbered 5136. Polstead, 1922 (*B. S. Harwood*). Bignell Collection: a card of four specimens (4 ♀♀), numbered 2690, dated in the register 26 June 1885 (*Bower*), two cards each of four specimens (each with 3 ♀♀, 1 ♂), numbered 2770 (see below), two cards each of five specimens (each with 4 ♀♀, 1 ♂), numbered 3145 and dated 17 June 1886 (*Bower*), and a card of four (3 ♀♀, 1 ♂), numbered 3683 and dated 21 June 1888. Bridgman Collection: a card of two (1 ♀, 1 ♂), with the Bignell register number 2770; and Ely, 1 ♀, 3 ♂♂, May 1887 (*W. J. Cross*). Imperial Institute of Entomology: Germany, Saxony, 4 ♀♀, 2 ♂♂, undated (*Herr Schutze per Dr. A. Roman*); England, Harefield, 8 ♀♀, 1 ♂, 26.v.1920, 13 ♀♀, 2 ♂♂, 2.vi.1920, Uxbridge, 12 ♀♀, 2 ♂♂, 16.vi.1917 (*per Dr. K. G. Blair*).

Type series in the Musée Royal d'Histoire Naturelle, Brussels; register serial number 2002. Type series of *cleoceridis* Mshl., in the Bignell Collection; serial number 2770 (see below).

Host. Wesmael's type series is without host record. Marshall described *A. cleoceridis* from *Cleoceris*, now *Bombycia viminalis* F., a Noctuid apparently restricted to Willow as a food-plant: the Bignell series numbered 3683 (referred to above) was also bred from this host. The two remaining series in the Bignell Collection are recorded by him to have been bred from *Tethea*, now *Ipimorpha, subtusa* F., also a Noctuid and apparently restricted to Poplar as a food-plant. Both Lyle's material and also the series from Germany are labelled to have been bred from *Xanthia citrago* L., again a Noctuid and again apparently restricted to one food-plant, namely Lime. Of the material from Harefield and Uxbridge, that from the former locality is labelled " ex ? *T. subtusa* ", and from the latter " in folded leaf of poplar.".

Cocoons gregarious, pure white.

Commentary. Wesmael originally described his species from a series of four females taken by him in the outskirts of Brussels. In the Wesmael Collection in Brussels is a series of four females that stands under this name. This is obviously the original series, and three of the specimens agree perfectly in the minutest detail with those of the series from Harefield and Uxbridge referred to above and with which I myself compared them. The fourth female was wrongly included by Wesmael, and belongs to a very closely related species.

Marshall originally described his *cleoceridis* from eight females and males bred by Bignell in England from two caterpillars of the host. These eight specimens are all in the Bignell Collection under his serial number 2770, against which number in his register are the following remarks: " n.sp. Marshall " and " from Mr. Rose, Barnsley," with the date 30 June 1885. Of the four series in the Bignell Collection there can be no doubt that that numbered 2770 is the one from which Marshall described the species; yet, I cannot understand why Hodgson must select that numbered 3683—I have removed his " type " labels.

Bridgman, despite Marshall, more or less succeeded in recognising *brevicornis*

Wesm., the material of this species in his collection, even the two specimens received by him from Bignell being placed under this name: they were, however, muddled up with some specimens not referable to this species. Lyle succeeded in recognising Wesmael's species, but he does not seem to have written on it. Marshall, of course, was altogether in error: imperfectly understanding from the authors' descriptions either *sericeus* or *brevicornis*, he sank the latter under the former (*Trans. ent. Soc. Lond.* **1885** : 177), and later erected his own *cleoceridis*, being correct in this at least that, unquestionably, *cleoceridis* did not agree with Nees's description of *sericeus*.

Apanteles brevicornis is a distinctive species, especially on account of the short antennae of its females. This character, however, it shares with one or two other species, notably *placidus* Hal., which latter is related in other respects also.

Apanteles cupreus Lyle.

Apanteles cupreus Lyle, 1925, *Ent. mon. Mag.* **61** : 120–121. Butterfield & Lyle, 1929, *The Naturalist* **1929** : 306.

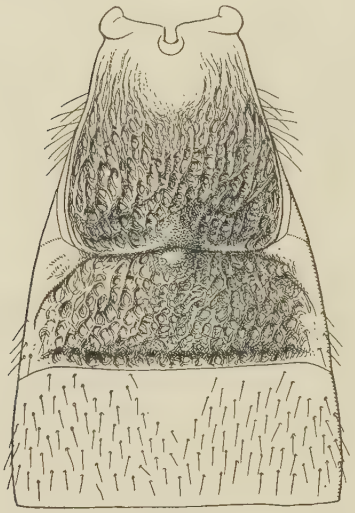
♀. Black; front femora in at least apical half, front and middle tibiae, front and middle tarsi (save for the feet and often for some other darkening), middle femora sometimes at extreme apex, hind tibiae in basal half or three-fifths, red testaceous; palpi and tibial spurs pale; wings slightly infumated, and the setae coloured; costal veins, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, red-brown, the costal veins in basal half perhaps red testaceous, and the remaining veins pale to colourless; stigma uniformly opaque.

♂. Black; front femora in about apical third, front tibiae and tarsi (save for the feet), middle tibiae to some extent in basal half, and hind tibiae in basal half, red testaceous; middle tibiae otherwise, and middle tarsi, darkened; palpi to some extent or even noticeably darkened; tibial spurs pale; wings white hyaline, and the setae white; costal veins, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, red-brown, the costal veins in basal half perhaps red testaceous, the remaining veins more or less colourless; stigma uniformly opaque.

♀♂. Head: face, clypeus, and frontal orbits, throughout with rather closely placed minute punctation (degree 2); frons and vertex minutely punctate (degree 2 or 1); facial depressions clearly nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ longer than combined length of thorax and abdomen, shorter than combined length of head, thorax, and abdomen, of ♂ rather variable in length, always longer than combined length of head, thorax, and abdomen, but sometimes longer than and sometimes shorter than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout closely, often even contiguously, punctate (degree 3), narrowly across posterior margin entirely smooth; disc of scutellum punctate (degrees 3 and 2); propodeon narrowly across extreme base smooth, otherwise coarsely and even quite strongly reticulately rugose throughout, more usually (but not invariably) with well-marked median longitudinal and transverse basal carinae. Metacarp equal in length to stigma. *Legs*: hind coxae basally above with a large area that is closely punctate throughout (degree 3), apically above longitudinally striate, on outer faces with much, ill-defined punctation (degree 2), and the outer faces otherwise hardly describable as smooth; hind tibial spurs equal in length, half or perhaps just longer than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 37, 38 and 39): 1st tergite excavate basally, throughout the basal half aciculate or, in the more strongly sculptured examples, with well-marked striation, in apical half turned over and minutely rugose; 2nd tergite minutely rugose; 3rd tergite smooth narrowly across base and apex and in a large median basal triangular area, otherwise minutely punctate;

succeeding tergites with the usual minute punctation; ventrites without median longitudinal suture; ovipositor sheaths about equal to or just longer than the basal segment, the ovipositor rather longer than combined length of basal and second segment, definitely shorter than combined length of the three basal segments, of the hind tarsus; hypopygium truncate, or perhaps occasionally just slightly acute.

Length, 2·25–2·7 mm.



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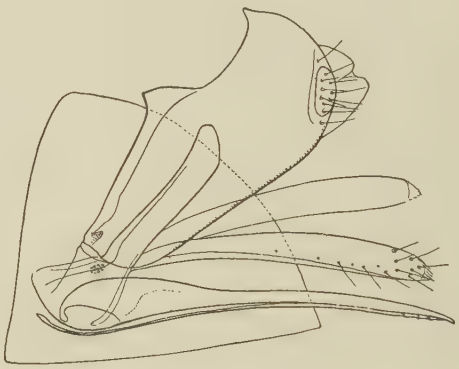

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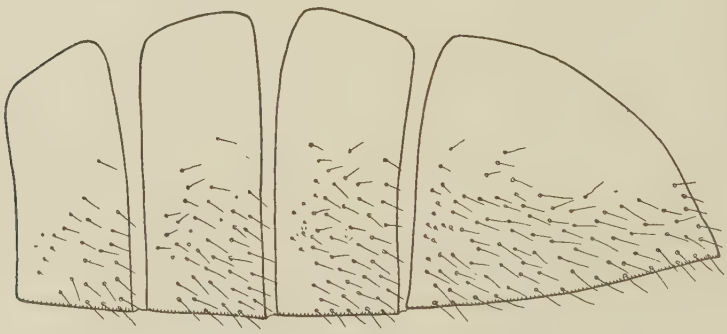

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Fig. 37.—*Apanteles cupreus* Lyle; basal tergites, ♀.

Figs. 38 & 39.—*Apanteles cupreus* Lyle: 38, genitalia, ♀; 39, apical ventrites, ♀.

Redescribed from the following material:—British Museum: Lyle Collection, Reigate, a card of seven (6 ♀♀, 1 ♂), ser. no. 4663, a card of eight (7 ♀♀, 1 ♂), ser. no. 4664, a card of seven (7 ♀♀), ser. no. 4666, all labelled *cotype*, and a card of seven (6 ♀♀, 1 ♂), ser. no. 4665, labelled *type*, 1923 (*A. E. Tonge*); General Accessions, Hull, 3 ♀♀, 1 ♂, 1.xi.1926 (*G.R.W.*), det. as *cupreus* Lyle. Zoologisches Museum der Universität, Berlin: Leipzig, 6 ♀♀, 20.ix.1890 (*Dr. R. Krieger*). Zoologisches Museum, Hamburg: Bahrenfeld, 1 ♀, 1 ♂, viii.1896 (*Kalbe*), det. Schmiedeknecht as *nothus* Reinh. [*sic*]. A. C. W. Wag-

NER'S COLLECTION: Hummelsbüttel, 2 ♀♀, no. 24, 1.iii.1916, Langenhorn, 4 ♀♀, 1 ♂, no. 30, 6.vi.1935. O. W. RICHARDS'S COLLECTION: Slough, Bucks, 2 ♂♂, nos. 38243, 38244. C. FERRIÈRE'S COLLECTION: France, Tence, H.-L., 4 ♀♀, 30.vii.1925. IMPERIAL INSTITUTE OF ENTOMOLOGY: France, Montpellier, 1 ♀, 1 ♂, vi.1932 (*per M. Suire*). D. S. WILKINSON'S COLLECTION: Kent, Ashford, 21 ♀♀, 3 ♂♂, x.1933 (*Dr. E. Scott*); Surrey, Mitcham, a card of nine (5 ♀♀, 4 ♂♂), a card of ten (5 ♀♀, 5 ♂♂), a card of ten (6 ♀♀, 4 ♂♂), a card of eleven (7 ♀♀, 4 ♂♂), and a card of eleven (8 ♀♀, 3 ♂♂), ix. (*Nixon*); Surrey, Mitcham, 13 ♀♀, 2 ♂♂, viii.1929, em. 4.ix.1929 (*G. E. J. Nixon*), det. Lyle as *cupreus* Lyle; Earlswood Common, 6 ♂♂, v.1923 (*Dr. G. V. Bull*).

Type series in the British Museum; Lyle ser. no. 4665.

Host. Lyle originally described his *cupreus* as a parasite of the Small Copper Butterfly, the Lycaenid *Chrysophanus*, now *Lycaena*, *phlaeas* L.; and from this host, often referred to under the generic names *Heodes*, *Chrysophanus*, or *Polyommatus*, are recorded all the above material from which I have made my redescription, with the exception of Ferrière's series, which is recorded from the Lycaenid *Lycaena*, now *Polyommatus*, *icarus* Rott., of Suire's pair from Montpellier, which is recorded from the Lycaenid *Lycaena*, now *Plebejus*, *argus* L., and of Krieger's six females from Leipzig, which are recorded from the Lycaenid *Polyommatus*, now *Lycaena*, *helle* Schiff.

Cocoons white, heaped irregularly together.

Commentary. Lyle originally described his *cupreus* from thirty-nine females, in four broods, bred by A. E. Tonge in 1923 at Reigate, Surrey, from larvae of the Small Copper, *Chrysophanus phlaeas*. Under the name *cupreus* in the Lyle Collection there were four cards of material. These cards are numbered, in the usual manner of the Lyle Collection, nos. 4663, 4664, 4665, 4666, and each is labelled "*C. phlaeas*. Reigate. 1923. A. E. Tonge", the card no. 4665 being further marked with a red mark and the others with a blue; while in Lyle's register against these numbers the *Apanteles* is given as "*cupreus* Lyle, cotypes", and the card no. 4665 as "*cupreus* Lyle. Type and cotypes". These specimens are quite obviously to be accepted as the original material, therefore; and they agree perfectly and in the minutest detail, despite their extremely bad condition, with all the other material before me from which I have redescribed the species.

It may be remarked that Lyle's statement that no male had yet been reared was incorrect, there being more than one male specimen amongst his material.

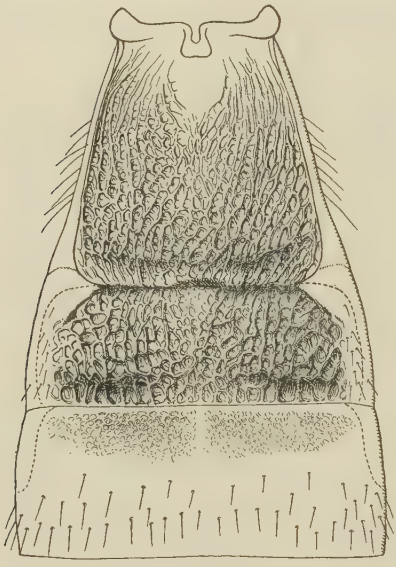
Apanteles tetricus Reinh.

Apanteles tetricus Reinhard, 1880, *Deuts. ent. Z.* **24** : 367–368. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 165–166; 1888, *Spécies Hymen. d'Eur.* **4** : 408. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 669. Gautier & Bonnamour, 1934, *Bull. mensuel Soc. Linn. Lyon* **1934** (7) : 115.

♀♂. Black; front femora in about the apical half, front and middle tibiae, front and middle tarsi (save for the feet and the apical joint, which are darkened), extreme apex of middle femora, hind tibiae basally, hind tarsi to some extent, all tibial spurs, and the basal ventrites, red testaceous; in various dark series, however, the middle tibiae and tarsi are much or even quite strongly darkened, the hind tibiae black or strongly darkened throughout or to some extent red testaceous only at extreme base, the middle femora entirely black, and the front femora red testaceous only apically, while in one or two light series the front femora are darkened at base only; palpi brown; wings infumated throughout, the setae coloured; the stigma, metacarp, and all veins in about apical two-thirds of the wing, brown,

the costal veins in about their basal half and the wing-veins in the basal portion of the wing much more testaceous; stigma uniformly opaque.

♀♂. *Head*: face, frontal orbits, frons, and vertex, punctate (degree 2 or 3); facial depressions much nearer to apex of clypeus than to the eyes; posterior ocelli nearer to each other than to the eyes; flagellum of ♀ variable in length, more usually about equal to the combined length of head, thorax, and abdomen, often shorter (notably in small specimens)



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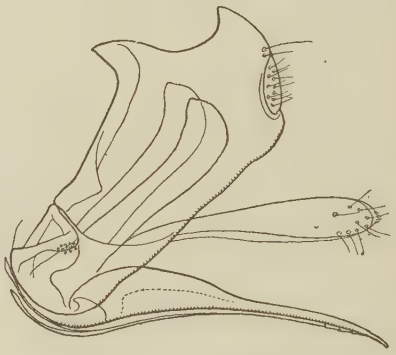

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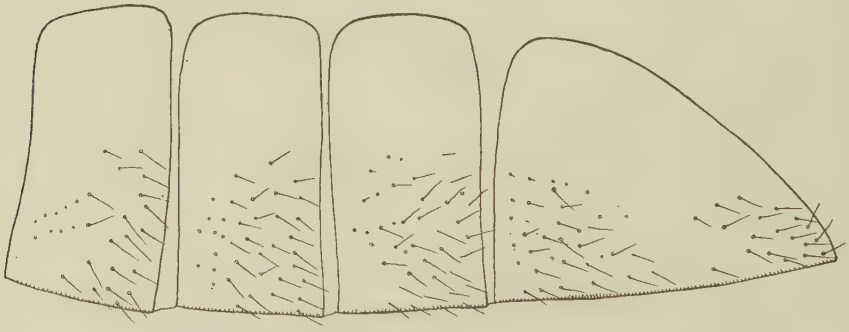

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Fig. 40.—*Apanteles tetricus* Reinhard; basal tergites, ♀.

Figs. 41 & 42.—*Apanteles tetricus* Reinhard: 41, genitalia, ♀; 42, apical ventrites, ♀.

and only equal to combined length of thorax and abdomen, of ♂ apparently not variable in length, longer than combined length of head, thorax, and abdomen, but not longer than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum finely rugose and dull, down the sides and narrowly across apex much smoother, much more shining, and punctate (degrees 3 and 4); disc of scutellum usually closely and strongly punctate (degree 4) throughout; propodeon coarsely, strongly, reticulately rugose throughout, often with a median longitudinal carina and transverse

basal carinae much in evidence through being stronger than, or more or less isolated from, the other carinae. *Legs*: hind coxae basally above smooth, shining, and strongly punctate (degree 4), otherwise above longitudinally aciculate, on outer faces more or less indefinitely aciculately punctate, or even sometimes describable as very finely, aciculately rugose; hind tibial spurs subequal in length, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 40, 41 and 42): 1st tergite to some extent excavate basally, strongly turned over apically, throughout rugose, but more strongly so apically than basally; 2nd tergite rugose; both 1st and 2nd tergites, but especially the 2nd and apex of the 1st, sometimes as coarsely and as strongly reticulately rugose as the propodeon; 3rd tergite aciculated or very finely rugose more or less throughout at least the basal third, otherwise smooth, in the ♀ with about two, irregular, transverse rows of minute punctures occupying about the median transverse third of the tergite, in the ♂ more extensively punctate than in the ♀; succeeding tergites in ♀ with about two irregular transverse rows of minute punctures, in ♂ more extensively punctate; ventrites without median longitudinal suture; ovipositor sheaths rather shorter than the basal joint, and the ovipositor itself about equal to the combined length of the two basal joints, of the hind tarsus; hypopygium apically perhaps just acute, below towards the base with some noticeable thickening.

Length, 2·0–2·5 mm.

Redescribed from the following material:—British Museum: Clapham, nr. Worthing, Sussex, 6 ♀♀, 6 ♂♂ (*F. Collin*), museum reg. ser. no. 1919–78, where dated 14.iv.1919; Marshall Collection, 2 ♀♀, det. as *tetricus*; Lyle Collection, Royston, a card of thirteen (12 ♀♀, 1 ♂), 21.viii.1918, reg. no. 3767 (*G. T. Lyle*), Faversham, a card of nine (9 ♀♀), 1918, reg. no. 3907 (*Robertson*) (*G. T. Lyle*), Blackdown [?], Somerset, a card of nine (9 ♂♂), 9.vi.1924, reg. no. 4810 (*Capt. Troup*), all three lots det. Lyle as *tetricus*. Bignell Collection, a card of eight (7 ♀♀, 1 ♂), reg. no. 208, the register giving 24.viii.1881 (*Mrs. Hutchinson*), a card of six (5 ♀♀, 1 ♂), reg. no. 1369, the register giving 5.vi.1883, both series det. as *tetricus*. Bridgman Collection: two cards, each of three (3 ♀♀; 2 ♀♀, 1 ♂), reg. no. 747, the register giving "*Apanteles tetricus* Reinh. Bignell 1885." Harwood Collection: Royston, a card of five (5 ♀♀), a card of four (4 ♀♀), a card of five (4 ♀♀, 1 ♂), viii.1918; Royston, 1 ♀, 1 ♂, viii.1918 (*Harwood*); 2 ♀♀, a card of two (2 ♀♀), a card of five (5 ♀♀); all in collection under *tetricus*. University Museum of Zoology, Cambridge: Clapham, nr. Worthing, Sussex, 2 ♀♀, 1 ♂ (*F. Collin*), British Museum reg. ser. no. 1919–78. Manchester University Museum: Freshfield, Lancashire, 10 ♀♀, 25.v.1933 (*T. S. Williams*), det. Nixon as *tetricus*. Zoologisches Museum der Universität, Berlin: Wien, 4 ♀♀. Zoologisches Museum, Hamburg: Boberg, 1 ♀, viii.1896 (*A. Sauber*). A. C. W. Wagner's Collection: Winsen, 3 ♀♀, 2 ♂♂, 6.viii.1907. Imperial Institute of Entomology: Montpellier, France, 4 ♀♀, vi.1932 (*J. Suire*), 10 ♀♀, vii.1932 (*J. Suire*); Mollon (Ain), 4 ♀♀, viii.1927 (*Gautier*); Kvaloen Is., Finmark, Norway, 45 ♀♀, 5 ♂♂, vi.1934 (*FitzGerald*); Freshfield, Lancashire, 10 ♀♀, 1 ♂, 25.v.1933 (*T. S. Williams*), det. Nixon as *tetricus*; Mullion, Cornwall, 20 ♀♀, 2 ♂♂, viii.1934 (*Miss R. M. Rowsell*); Devils Ditch, 4 ♀♀, v.1935 (*G. C. Varley*); Dartmoor, 8 ♀♀, 1935 (*R. C. L. Perkins*).

Further material examined:—Reinhard Collection, 4 ♀♀ (one the *type*), 1 ♂.

Type in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26921.

Host. The original description of *tetricus* is without host record. Of the material from which I have redescribed this species, the Bignell series of eight

is recorded in his register as a parasite of the Satyrid, *Satyrus janira* L., a species now known as *Maniola jurtina* L.; while Miss Rowsell records her material from Cornwall from this species also, but under the name *Epinephele janira* L. The series from Royston in the Lyle Collection is recorded from the Satyrid *Pararge megera* L., as is also all the material in the Harwood Collection from Royston; while the four females from Vienna in the Berlin Museum are labelled as parasitic upon a species of the Satyrid genus *Erebia*, and the single female in the Hamburg Museum on a Satyrid larva. The two females in the Marshall Collection are labelled as parasites of the Zygaenid, *Zygaena filipendulae* L., and are almost certainly part of the material referred to by Marshall in his monograph of the British Braconids, wherein he says :—" . . . and I found a batch of 30 cocoons attached to grass near Teignmouth. Very likely these were from *Zygaena filipendulae* L., the larvae of which were feeding round about." Personally, I think this host record is incorrect, and that it should be suppressed; *A. tetricus* is so obviously a parasite of Satyrids. The remainder of the material from which I have made my redescription is without host record, but many of the series are recorded from cocoons collected on grass, or some such wording.

Gautier & Bonnamour published a short note in 1935, under the name *tetricus*, and gave therein the conditions under which they had collected their material, of which I have four females, referred to above. They say :—" L'un de nous a trouvé à Mollon (Ain), en août 1927, un champ de trèfle où les amas de petites coques blanches d'un *Apanteles* foisonnaient avec une telle abondance qu'on eût dit une multitude de capitules."

Brischke (1882 : 134) records *A. tetricus* as a parasite of the Geometrid *Eupithecia exiguata* Hübn. I have not seen his material, but I agree with Marshall (1885 : 166) that Brischke has mistaken the species. Lyle (1916) states he possesses a specimen, which he refers doubtfully to *tetricus*, bred by Major Robertson from the Arctiid, *Parasemia plantaginis* L.; here again, although I have not seen the material, I believe a mistake has been made.

Cocoons white, in a loose, more or less irregular mass on a twig or a blade of grass, but not or hardly contiguous with one another, and held in place by a few strands of white silk.

Commentary. Reinhard originally described this species from an unstated number of both females and males, without remark other than that it was fairly common. In the Reinhard Collection standing under this name are four females and one male. This material agrees together and perfectly with Reinhard's description, and it is quite obviously to be accepted as the original series. It agrees perfectly and in the minutest detail with the material from which I have made the redescription and with the majority of which I myself compared it.

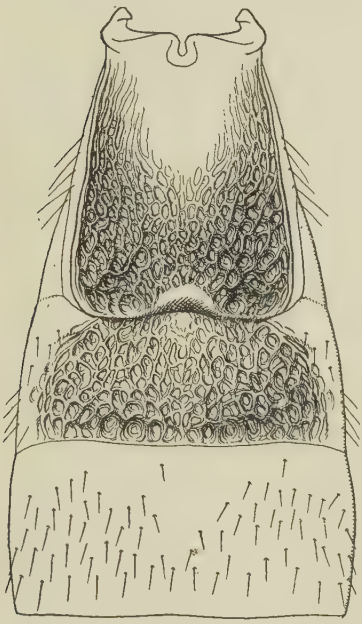
Apanteles zygaenarum Marsh.

Apanteles zygaenarum Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 181–182; 1888, *Spécies Hymen. d'Eur.* **4** : 427–428. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 671. Lyle, 1916, *Entomologist* **49** : 231–232. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 409.

♀. Black; the front femora (except at base), front and middle tibiae wholly, middle femora at extreme apex, hind trochantines to some extent and sometimes middle trochantines also (but not the hind or middle trochanters), and the hind tibiae (except at apex), red testaceous; all tarsi much darkened, but those of the four anterior legs commonly red testaceous (save for their feet); palpi (save sometimes for the basal joint or joints) and tibial spurs pale; wings infumated throughout, the setae coloured; the stigma, metacarp,

and veins, brown, but the costal veins and other veins at the base of the wing testaceous; stigma uniformly opaque.

♂. Rather darker than female, the front femora being black in the basal third, the middle



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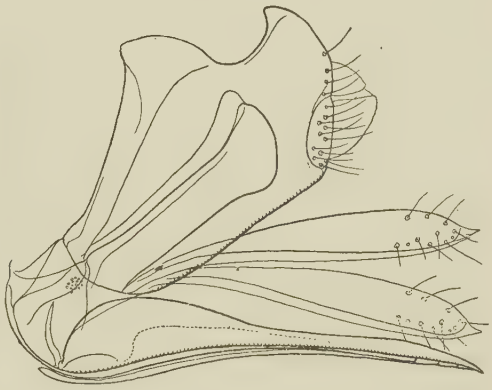

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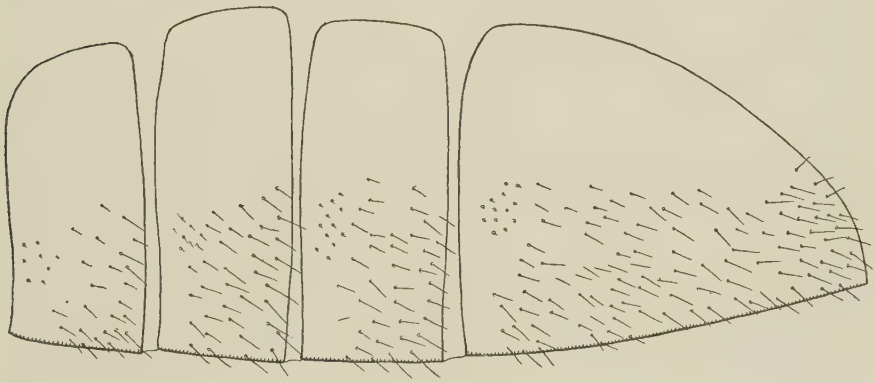

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Fig. 43.—*Apanteles zygaenarum* Marshall; basal tergites, ♀.

Figs. 44 & 45.—*Apanteles zygaenarum* Marshall: 44, genitalia, ♀; 45, apical ventrites, ♀.

femora sometimes wholly black, the middle tibiae somewhat darkened at apex, and the hind tibiae strongly darkened or even black in as much as the apical third.

♀♂. *Head*: face, clypeus, frontal orbits, frons, and vertex, punctate (degree 2); facial depressions distinctly nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and from the eyes; flagellum of ♀ equal to or rather longer than, rarely

rather shorter than, the combined length of head, thorax, and abdomen, of ♂ equal to or rather longer than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum closely punctate (degree 3), along the lines of the notauli and in the large posterior area into which they lead minutely rugose, narrowly across extreme apex entirely smooth; disc of scutellum punctate (degree 3), the punctures much more widely placed than those on the mesonotum; propodeon coarsely, and very often quite strongly, reticulately rugose, with transverse basal carinae which are more usually strongly marked, and with a median longitudinal carina which is sometimes quite strong. *Legs*: hind coxae basally above with numerous strong punctures (degrees 3 and 4), apically above longitudinally aciculate, on outer faces regularly punctate (degree 2); the hind tibial spurs subequal, the longer spur about two-thirds the length of the basal joint of the hind tarsus. *Abdomen* (figs. 43, 44 and 45): 1st tergite basally excavate, shining, and more or less smooth but commonly with longitudinal striation down the sides, apically turned over, in about the apical half rugose, medianly tumescent to a variable extent and strength, and with the smooth median apical lunule much in evidence; 2nd tergite rugose, in one or two series noticeably longer than in the typical form; 2nd suture well marked; 3rd tergite smooth and shining, throughout minutely punctate save across base and apex and for a more extensive median basal area; succeeding tergites apparently with at most two transverse rows of minute punctures; ventrites without median longitudinal suture; ovipositor sheaths about equal in length to or rather shorter than the basal joint, and the ovipositor equal to the combined length of the two basal joints, of the hind tarsus; hypopygium at apex truncate.

Length: ♀, 2·3–3·0 mm.; ♂, 2·3–2·75 mm.

Redescribed from the following material:—British Museum: Marshall Collection, 1 ♀, Bignell ser. no. 1909; Lyle Collection, a card of five (4 ♀♀, 1 ♂), Shoreham, *undated*, Lyle register no. 225 (*C. W. Colthrup*), a card of eighteen (12 ♀♀, 6 ♂♂), Redhill, 24.vi.1911, reg. no. 1363 (*G. T. Lyle*), a card of nine (7 ♀♀, 2 ♂♂), New Forest, 12.vii.1911, reg. no. 1402 (*G. T. Lyle*), all det. Lyle as *zygaenarum*; Boston, Kirton, Lincs, 8 ♀♀, 26.vi.1922 (*H. W. Miles*), det. as *zygaenarum* possibly by Waterston. Bignell Collection: a card of five (5 ♀♀), 11.viii.1885, Bignell reg. no. 2951; a card of six (6 ♂♂), and a card of four (4 ♂♂), *without any data*. Bridgman Collection: a card of two (2 ♂♂), Bridgman reg. no. 760, and 3 ♀♀, 3 ♂♂, Bridgman reg. no. 1003, all obviously on cut-up Bignell cards, the register giving respectively the dates 1885 and July 1888, and stating the material was received from Bignell. Fitch Collection: a card of two (2 ♂♂), and 1 ♀. Harwood Collection: 1 ♀, and 1 ♂. University Museum of Zoology, Cambridge: a card of six (3 ♀♀, 3 ♂♂), 3.vii.1888, det. Bignell as *zygaenarum*; Zoological Gardens, London, 2 ♀♀, vii.1919 (*Miss L. E. Cheesman*). Manchester University Museum: Pwllheli, N. Wales, 10 ♂♂, 8.vi.1927 (*W. Buckley*); Delamere, Cheshire, 3 ♀♀, 6 ♂♂, 23.vi.1934 (*H. Britten*). Zoologisches Museum der Universität, Berlin: Rüdersdorf, 8 ♀♀, 6 ♂♂, 1.vii.1901 (*Ude*). Imperial Institute of Entomology: Isles of Scilly, 2 ♀♀, 13 ♂♂, 1919; I. of Wight, Shanklin, 10 ♀♀, 3 ♂♂, iv.1920; Isles of Scilly, St. Mary's, 4 ♀♀, 6 ♂♂, 14.vii.1927, Tresco, 4 ♀♀, 4 ♂♂, 18.vii.1927; Bucks, Halton, 10 ♀♀, 5 ♂♂, 7.vii.1929 (*R. B. Benson*); Kent, Eynsford, 3 ♀♀, 6 ♂♂, 16.vii.1932; Oxford, Wallington, 4 ♀♀, 3 ♂♂, 1936 (*H. L. Dolton*).

Type in the British Museum.

Host. Marshall originally described this species as a parasite on the Zygaenid, *Zygaena filipendulae* L.; and from this host are recorded the following series of the material that I have examined, namely, the Lyle material

bearing his register numbers 225 and 1402, the Bignell material with his register number 2951, the two males in the Bridgman Collection numbered 760, the two males in the Fitch Collection, the eight females bred by Miles from Boston, the two females bred by Miss Cheesman, both series in the Manchester Museum, the three series from the Scilly Isles, and the series bred by Dolton from Wallington, while the single female in the Harwood Collection is recorded doubtfully from this host. The following series before me are recorded from *Zygaena trifolii* Esp., namely the Lyle material bearing his register number 1363, the Bridgman series numbered 1003, the cardful of six in the Cambridge University Museum, and the series from the Isle of Wight, while Benson's series from Halton is recorded doubtfully from this host. The series from Rüdersdorf is recorded from *Zygaena achillaeae* Esp. The remainder of the material before me is without host record.

Lyle in his well-known work in the *Entomologist*, which I have referred to in the synonymy, mentions all that material of his which I have listed above, and further material in addition which I have not seen, and states, *inter alia*, that the larvae of this species of parasite emerge from their host when the latter is nearly full fed, that his, Lyle's, broods consisted of from seven to twenty individuals, and can be, he believes, even larger, and that in each brood the sexes were about equally divided.

Bignell in 1901, when recording this species from *Z. filipendulae*, remarked " also obtained from *Lycaena icarus* "; and Marshall also, in 1888, mentioned this host. Standing with the material of *zygaenarum* in the Bignell Collection was a single female labelled with the serial number 3150, and from the data in his register it is quite clear that this is the material to which Bignell was referring. The specimen is not referable to *zygaenarum*, however, and consequently this host record should be suppressed.

Billups in 1889A records *Apanteles zygaenarum* to have been bred by South from *Melitaea aurinia* Rott., and in the *Proceedings of the South London Entomological Society* (**1887** : 57) there is a note to the effect that Billups exhibited at a meeting a number of living specimens of this *Apanteles* bred from this host; and Marshall also, in 1888, mentioned this host. I have seen no material of *zygaenarum* bred from *aurinia*, and I consider this record to be incorrect.

In 1885 Billups recorded *zygaenarum*, amongst many other species of various Orders, from galls, many of them old galls, of *Cynips kollari* collected on Weybridge Common and Chobham railway-banks. Personally, I consider that some mistake has been made here also.

Watanabe (1932 : 80) gives *Colias hyale* L., as a host of *zygaenarum* in Japan; but I have not seen any of the material upon which this record is based.

Cocoons pale sulphur-yellow, in a loose irregular cluster; according to Lyle this cluster is generally attached to a grass-stem some inches above the ground.

Commentary. Marshall originally described his species in 1885 and stated " two females and 4 males, bred by Bignell from *Zygaena filipendulae* L., remain, others having been destroyed. Bignell also captured a ♀"; and Bignell, in his paper of 1901, says " Bred from *Zygaena filipendulae*, 21 July, 1883, and several times since; . . .". In the Bignell register under the date 21 July 1883, is the following entry :—" 1597, *Apanteles zygaenarum* NS. Marshall. Bred from *Z. filipendulae*." A search through the Bignell Collection and the other collections of *Apanteles* material such as the Bridgman and Fitch collections, has failed to produce any specimens bearing the Bignell serial number 1597. In the Marshall Collection, however, as I have mentioned previously in the list of material from which I have redescribed the species, is a

single female labelled *zygaenarum* in the usual manner for the Marshall Collection and bearing the Bignell serial number 1909. Against this number in Bignell's register is the following entry :—" 1 Augt. 1884. *Apanteles zygaenarum* NS. Oreston Quarry ". There is no mention of *zygaenarum* in Bignell's register between the numbers 1597 and 1909, and the next record of this species is not until 2951, under the date 11 Aug. 1885, and then the entry lacks the " NS ". There is no other record of this name in the register before 1886. No doubt exists but that this single specimen numbered 1909 is the captured female referred to by Marshall. Also, it must now be the type of the species since the bred material has been lost; and I have so labelled it. It is fortunate that Marshall's determination of this specimen was correct : it is a fact that this specimen agrees perfectly and in the minutest detail, even as to facies, with the majority of the material before me bred from *Z. filipendulae* and the other Zygaenid hosts. I say, with the majority of the material before me, deliberately, since as I have previously remarked this species is inclined to vary in the shape of its 2nd tergite.

Hodgson in his paper in 1917 on the Bignell material says, *inter alia* :— " Six insects, two cocoons. Type." Such a cardful is in the Bignell Collection, bearing a red type label. There is no serial number or any data on the card, and the material comprises only males. This lot cannot possibly be accepted as the type material, if only on account of the sex of the specimens, and I should be much interested to know who it was that affixed the type label.

Apanteles bignellii Marsh.

Apanteles bignellii Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 171; 1888, *Spécies Hymen. d'Eur.* **4** : 414, *loc. cit.* **5 bis** : 177. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 13. Lyle, 1916, *Entomologist* **49** : 163. Hodgson, 1917, *Trans. Devon. Assoc. Adv. Sci.* **49** : 407.

♀. Black; flagellum basally to some extent, legs throughout (save for the claws and for the apical joint of all tarsi, which are darkened), palpi, tibial spurs, red testaceous; abdomen red testaceous or red, with the 1st and 2nd tergites (but not their lateral membranous margins, which remain red testaceous) red or reddish, or, particularly the 1st tergite, reddish-black or black; the ovipositor sheaths black; wings hyaline and the setae coloured, but not invariably so in that the more recently bred examples occasionally, and in the older examples very commonly, the wings are more rightly describable as white hyaline with the setae white; wing-veins, stigma and metacarp brown; stigma uniformly opaque.

♂. Black; about the apical third or half of the front femora, middle femora at apex, hind femora occasionally, all tibiae and tarsi, more or less red testaceous, possibly more rightly describable as nigrescent; palpi darkened; tibial spurs pale; wings white hyaline with the setae white; wing-veins, stigma and metacarp brown; stigma uniformly opaque.

♀♂. *Head* : face and clypeus punctate (degree 2 or 3), the face (save laterally and for a median area) almost describable as minutely rugose; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex punctate (degree 2 or 3); posterior ocelli nearer to each other than to the eyes; flagellum of ♀ rather longer than combined length of head and thorax (90 : 80), much shorter than combined length of thorax and abdomen, of ♂ equal to combined length of head, thorax, and abdomen. *Thorax* : mesonotum along the lines of the notauli with closely placed, strong punctation (degree 4), elsewhere the punctures weaker (degrees 2 and 3) and very definitely more widely separated; scutellar sulcus with about eleven crenulations; disc of scutellum with widely spaced punctation (degree 3); propodeon with much, fine, fairly widely placed, irregular carination, save medianly in the basal third where it is always distinctly sunken and often with the carination much less in

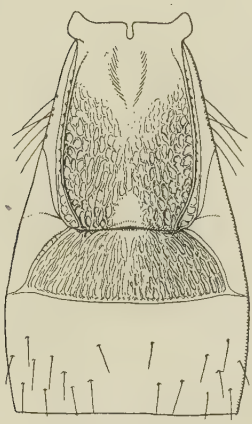

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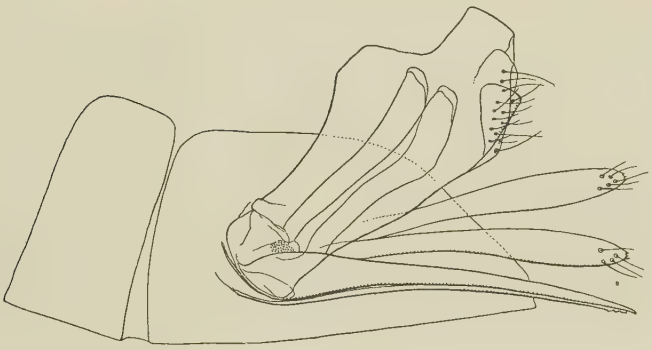
Fig. 46.—*Apanteles bignellii* Marshall; basal tergites, ♀.



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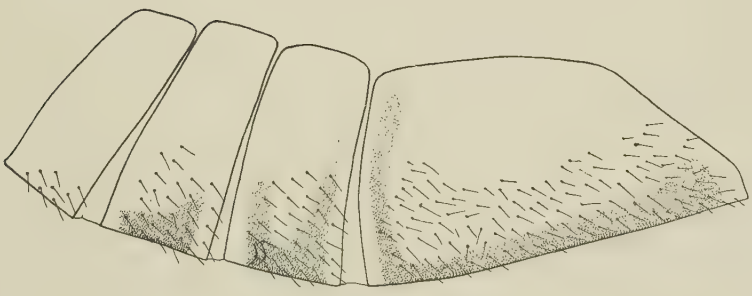

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Figs. 47 & 48.—*Apanteles bignellii* Marshall: 47, genitalia, ♀; 48, apical ventrites, ♀.

evidence, and save in its apical angles where it is shining and almost entirely devoid of this carination. *Wings*: a few males exhibit an unusual aberration—either in one or in both wings with the upper half or two-thirds of the radial vein wanting, or even with the radial vein entirely wanting; one male, also, has a short vein, which is about as long as the upper portion of the basal vein, projecting from the transverse cubital vein inwards into the 1st cubital cell. *Legs*: hind coxae basally above, and on outer faces, with only sparsely placed, minute (degree 1) punctation; the hind tibial spurs equal, or certainly subequal, half or even possibly just less than half the length of the basal joint of the hind tarsus; length of hind tarsus with the claw in ♀ equal to, in ♂ equal to or just a little longer than, the hind tibia. *Abdomen* (figs. 46, 47 and 48): extent and strength of sculpture on the two basal tergites variable; 1st tergite in about basal half excavate and more or less smooth, in about apical half with fine, longitudinal, rugose striation, which is weaker in the ♂ than in the ♀; 2nd tergite more or less throughout with fine, more or less rugose striation or aciculation, which is longitudinal medianly but oblique laterally (thus laterally running parallel with the lateral margins), and which in the ♂ is on the whole decidedly weaker and sparser than in the ♀; 3rd and succeeding tergites entirely smooth save for one (or at most one complete) transverse row of minute (degree 1) punctures; ventrites of ♀ without median longitudinal suture; ovipositor sheaths just about as long as the hind coxae, definitely shorter than the hind femora; hypopygium large, acute, but cut away at apex so as to be truncate, transparent so that the ovipositor and sheaths can be seen lying inside along the bottom.

Length: ♀, 2·0–2·25 mm.; ♂, 1·75–2·0 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a cardful of four (2 ♀♀, 2 ♂♂), with Bignell's serial number 1603, Devonshire, England. Bignell Collection: a cardful of five (3 ♀♀, 2 ♂♂), without serial number, dated 26 July 1883, Devonshire, England; a cardful of four (2 ♀♀, 2 ♂♂), without serial number, dated 1 Aug. 1883; a cardful of sixteen (8 ♀♀, 8 ♂♂), without serial number, dated 8 July 1893, Ireland. Bridgman Collection: a cardful of two (1 ♀, 1 ♂), with Bridgman's serial number 1005. Fitch Collection: a cardful of four (3 ♀♀, 1 ♂), without serial number, England, dated 10 Aug. 1883. A. C. W. Wagner's Collection: Winsen, Germany, 4 ♀♀, 2 ♂♂, ser. no. 70, 2.viii.1907, 4.viii.1907, 5.viii.1907, 9.viii.1907, 10.viii.1907, 11.viii.1907. Imperial Institute of Entomology: Bog of Allen, Kildare, Ireland, 69 ♀♀, 49 ♂♂, vii.1933 (*M. Westrop*).

Type in the British Museum.

Host. This species was originally described as a gregarious parasite of the Nymphalid butterfly, *Melitaea aurinia* Rott., and all the above material from which I have redescribed it is recorded from this host, or, in the case of some of the earlier material, from *M. artemis* Schiff., a name now sunk under *aurinia*.

Cocoons white, gregarious, heaped together indiscriminately, and covered with a cottony mass of white silk.

Commentary. Marshall originally described this species in 1885 from five females and four males that had been bred by Bignell from *Melitaea aurinia* Rott., taken in North Devon. Now, the single cardful in the possession of the British Museum is, as has been stated, numbered with Bignell's serial number 1603, and the information against this number in Bignell's register shows that the material was dated 26 July 1883, and was bred from two larvae of "*Melitaea artemis*" "taken at Ebberly near Roxborough, N. Devon, 4½ miles from Gt. Torrington, by F. F. Freeman": some of this information was written by Bignell on the underside of the card also. The cardful of five in the Bignell Collection, also of course referred to above, has no serial number, but written

on the underside by Bignell is the following data : " Bred 26 July 1883. From *Melitaea artemis* larvae from North Devon." The material on these two cards, therefore, is the same series. Since it totals nine specimens, namely five females and four males, and since in addition the card belonging to the British Museum came from the Marshall Collection, it is quite clear that this is the series from which the species was originally described. The card in the British Museum is correctly labelled, therefore, with a type label : and I myself have now indicated, with a cross, the better of the two females as the type itself.

The cardful of four in the Bignell Collection is without a serial number. On the underside of the card is written " Bred from *Melitaea artemis*. 1 Augt. 1883 ", the words " bred from " having without doubt been written in afterwards. The cardful of two in the Bridgman Collection bears Bridgman's serial number 1005, against which in his register is given " *Apanteles bignelli*, Marsh. from Bignell." On the underside of the card is written only the words " Bred from ", and it is quite clear, if only from the remarks that I have made above, but also from the fact that portions of certain letters occur on both cards, that this card of two in the Bridgman Collection was cut off from the top of the card now consisting of four specimens in the Bignell Collection.

The card of four in the Fitch Collection seems to have no relationship with the others referred to above. On the underside is written in Bignell's writing " Bred 10 Augt. 83. From *M. artemis*. Larvae from North Devon." The pin also bears a label " *Apanteles bignellii*, n. sp."

The Bignell Collection also possesses a cardful of sixteen specimens, host larva, and cocoon-mass, with a number of *Apanteles* loose amongst the silk. As Hodgson has intimated, the following data are given on the underside of the card : " Bred from *Melitaea aurinia* larva from Ireland 8 July 1893. *Apanteles Bignellii*. Presented by G. C. Bignell 10 July 1893." Hodgson referred to this lot as " the card marked type " : and it is a fact that this cardful bears a red type label. It is quite impossible, however, for this to be the type series, owing to the date, the numbers in the series, and to the locality in which the host is recorded to have been taken : and I should much like to know, for certain, who it was that made such a ridiculously stupid error as to label this series with a type label—it was not Hodgson, as may be determined from his remark " the card marked type."

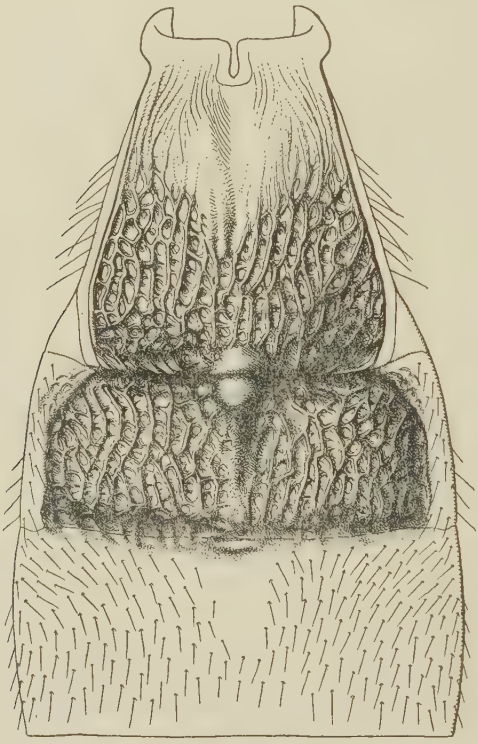
Hodgson also refers to a M.S. note of Bignell's. This note is in Bignell's copy of Marshall's British Braconidae. Hodgson has not quoted the note quite accurately, the information it gives being that 3 ♂♂ and 11 ♀♀ (not 8 ♀♀, as given by Hodgson) were bred on the 1st, and (subsequently interpolated) 3 ♂♂ and 8 ♀♀ on the 6th, of August 1891, from a larva of *Melitaea aurinia* found by W. F. de V. Kane near Wicklow, Ireland, in June, the mass of cocoons having been received on 26 June. Bignell's remarks against *bignellii* in his paper in the Transactions of the Devonshire Association will agree neither with his own m.s. notes nor with Marshall's published statements : I think that there must be one or two printers' errors here that Bignell overlooked.

Finally, it should perhaps be noted, with regard to the certain slight differences between the males and females of this species, that both Marshall and Bignell remark that " the sexes are so unlike that no one, without breeding them, would suspect their identity," and Lyle, that " the male appears to be widely different " ; and that I consider these statements to be wildly extravagant.

Apanteles rubecula Marsh.

Apanteles rubecula Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 175; 1888, *Spécies Hymen. d'Eur.* **4** : 419–420. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 670. Wilkinson, 1932, *Trans. ent. Soc. Lond.* **80** : 334.

♀♂. Black; palpi, tibial spurs, and all legs (except as follows), red testaceous; all coxae, certain portions of the front trochanters, the middle and hind trochanters wholly, apex of hind femora and of hind tibiae, black, the apical segment of the tarsi of the four anterior legs, the hind tarsi wholly, and all feet, strongly darkened; extent of black apical marking of hind femora very variable, more usually about the apical sixth or fifth of the femur so occupied, but sometimes so much as the fourth, and even rarely the third, while



49

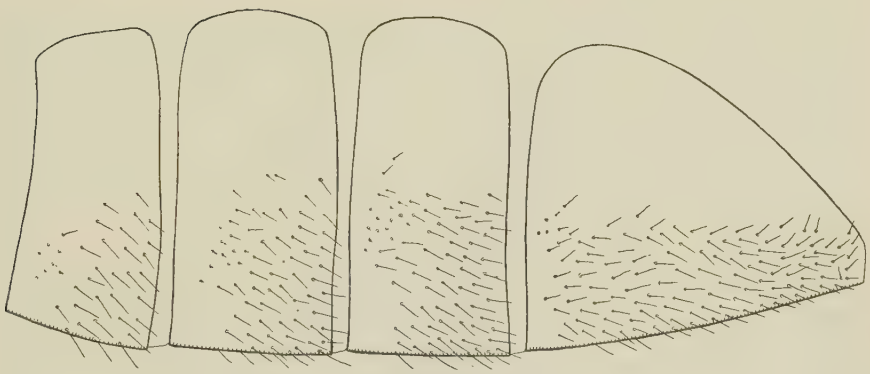
Fig. 49.—*Apanteles rubecula* Marshall; basal tergites, ♀.

in addition the larger part of both the upper and lower margins are sometimes, but extremely rarely, black also; wings infumated evenly throughout, the setae coloured; wing-veins in the basal portion of the wings red-testaceous, elsewhere brown or dark brown, the stigma and metacarp brown or dark brown; stigma uniformly opaque.

♀♂. *Head*: face and clypeus punctate (degree 3), the punctures closely placed; the face medianly, shortly below the insertion of the antennae, with an obsolete protuberance; facial depressions nearer to apex of clypeus than to the eyes; frontal orbits with closely placed punctation (degree 3) and with some minute carinulae; frons and vertex minutely punctate; posterior ocelli perhaps just nearer to the eyes rather than equidistant from each other and the eyes; flagellum of ♀ about equal to or rather longer than combined length of

head, thorax, and abdomen, of ♂ equal to or longer than combined length of thorax and abdomen together with twice the length of the head, sometimes even as long as combined length of thorax and abdomen together with three times the length of the head. *Thorax*: mesonotum strongly punctate (degree 4), and anteriorly, along the lines of the notauli, and the large area in the posterior half into which they lead, strongly reticulately punctate (degree 5); scutellar sulcus very strong and deep, virtually straight, very broad, with about eight very strong crenulations; disc of scutellum throughout with shallow more or

50



51

FIGS. 50 & 51.—*Apanteles rubecula* Marshall: 50, genitalia, ♀; 51, apical ventrites, ♀.

less indefinite punctation; propodeon very strongly and coarsely reticulately rugose throughout. *Legs*: hind coxae basally above throughout strongly and coarsely punctate (degree 4), on outer faces throughout punctate but more weakly (degree 3) and more sparsely, apically above longitudinally aciculate and striate; the hind tibial spurs subequal, the longer spur five-eighths, and the shorter spur half, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 49, 50 and 51): 1st tergite in the basal half excavate, shining, and smooth save for a variable amount of longitudinal carinulation, in the apical half turned over and strongly rugose; 2nd tergite rugose, more finely so than the apical half of the 1st tergite, and with a very well-marked median basal protuberance; 2nd suture well marked; 3rd tergite smooth and shining, with regular, minute punctation (degrees 2 and 3) throughout save very narrowly across base and much more broadly across apex and

in a large median basal area, the punctures often forming aciculation and minute rugosities, especially in larger females, this sculpture occasionally quite strong; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; ovipositor sheaths much shorter than the basal segment, about equal to the combined length of the 3rd and 4th segments, the ovipositor equal in length to the basal segment of the hind tarsus; hypopygium with its posterior angle cut away to form a short lower-posterior margin.

Length, 3·0–3·5 mm.; an occasional ♂ specimen of 2·5 mm.

Redescribed from the following material:—British Museum: Marshall Collection, 1 ♀ (*type*), 17.vi.1884; Lyle Collection, New Forest, 1 ♀, 10.viii.1911, ser. no. 1463 (*G. T. Lyle*), Dulwich, 1 ♀, vii.1917, ser. no. 3427 (*Colthrup*), Sunbury, 1 ♀, 22.vii.1928 (*D.S.W.*), all det. Lyle as *rubecula*. Plymouth Museum: Bignell Collection, 1 ♀, reg. no. 1845, in register dated 11.vi.1884 and det. as "*rubecula* n.sp. Marshall." Oxford University Museum: Oxford, 2 ♀♀, em. 5–8.vi.1925. Stored Products Research Laboratory, Slough: 8 ♀♀, nos. 243, 269, 340, 466, 612, 30834, 30928, 30930, 8 ♂♂, nos. 30926, 1017–27–6, 1044–26/6, 1121–26–6, 1121–27–6, 1138–28/6, 1147–23–6, and xix, all det. Richards as *rubecula*; Slough, Bucks, 53 ♀♀, 40 ♂♂, *undated* (*O. W. Richards*). Bundesanstalt für Pflanzenschutz, Wien: Wien, 1 ♂, 1935. C. Ferrière's Collection: France, Chaton, S. & O., 1 ♂, 1 ?, 1926 (*Chevalier*), det. Ferrière as ? *rubripes* Hal. Imperial Institute of Entomology: Hoorn, Holland, 6 ♀♀, 13 ♂♂, xi.1937, Holland, 1 ♀, 4 ♂♂, 16, 17, and 18.viii.1937.

Type in the British Museum.

Host. This species was originally described as a solitary parasite of the Pierid butterfly, *Pieris rapae* L. Of the material from which I have made my redescription the following series were bred from this host, namely the single female from Dulwich, the single female in the Bignell Collection, the two females from Oxford, the two long series from the Stored Products Research Laboratory, and the two specimens from Chaton, while the single male from Vienna is recorded from *Pieris napi* L. The two series from Holland are recorded from the Tineid, *Plutella maculipennis* Curt., on cabbage; and Lyle's female from the New Forest from a cocoon found on cabbage, and the female from Sunbury to have been taken on the wing round cabbage.

A few authors have written on this species, and in some instances I can obviously accept their records although I have not seen their material. Moss (1933), in his study on the parasites of the cabbage caterpillars with a view to their shipment to New Zealand, remarks that *rubecula* was obtained from a large number of larvae of *P. rapae*, but never from *P. brassicae* L., that it does not, so far as is known, ever attack this latter species, that it is a solitary parasite, only one parasitic larva developing within the host-caterpillar, and that the parasite emerges when the host is almost half-grown. Gautier & Riel (1921), also, record *P. rapae* as a host in France, and Meier (1934) records that species as well as *Plutella maculipennis* to be the hosts in Russia.

Ferrière's record (1928) of the Lasiocampid, *Macrothylacia rubi* L., and Lyle's (1916) of the Sphingid, *Hemaris fuciformis* L., are definitely incorrect—the *Apanteles* material upon which these authors base their remarks is before me as I write, and is not referable to *rubecula*. Rudow (1917), in addition to recording *P. rapae*, gives a Sphingid also, namely *Smerinthus*, now *Amorpha*, *populi* L.; and I have little doubt but that the *Apanteles* material that was bred from this latter is referable to the same species that Lyle obtained from his Sphingid host.

Cocoons pale cream-coloured, and rather wrinkled.

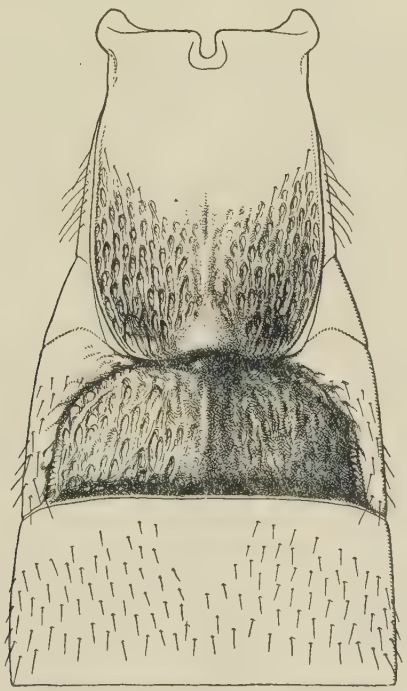
Commentary. Marshall originally described his *rubecula* from two specimens, presumably both females since he describes the species only from the female, and as " bred by Bignell, singly, on June 17th, from half-grown larvae of *Pieris rapae* L." The single female in the Marshall Collection, which was standing here under the name *rubecula* and which was labelled with a typical Marshall label, has the following words written on the underside of the card—" From *Pieris rapae.* 17 June 1884. Larva of victim not . . ." This specimen already bore a type-label, affixed by whom I do not know, and it is quite obvious it is indeed this specimen that is to be accepted as the type of the species; and I have so labelled it.

The female in the Bignell Collection bears the Bignell serial number 1845 and is dated in the register 11 June 1884. It cannot, therefore, be the type, despite Hodgson's statement (1917). Also on this card, as noted by Hodgson, is another specimen; but this is not referable to the species under discussion.

Apanteles gonopterygis Marsh.

Apanteles gonopterygis Marshall, 1897, *Spécies Hymen. d'Eur.* **5 bis** : 180–181. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 676. Lyle, 1916, *Entomologist* **49** : 272. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 410–411.

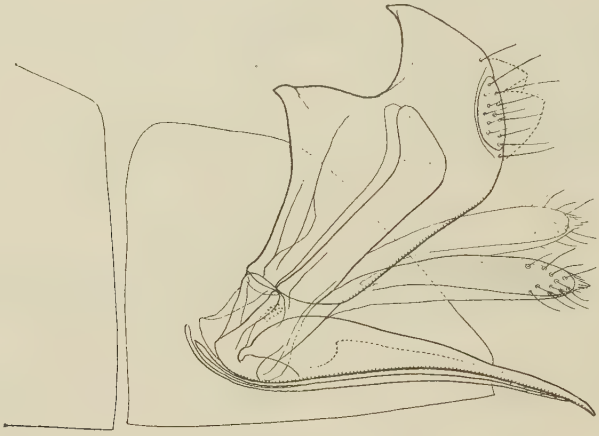
♀♂. Black; apical half or three-fifths of the front femora, the front tibiae and front and middle tarsi wholly (save for the black feet and darkened apical joint), middle femora



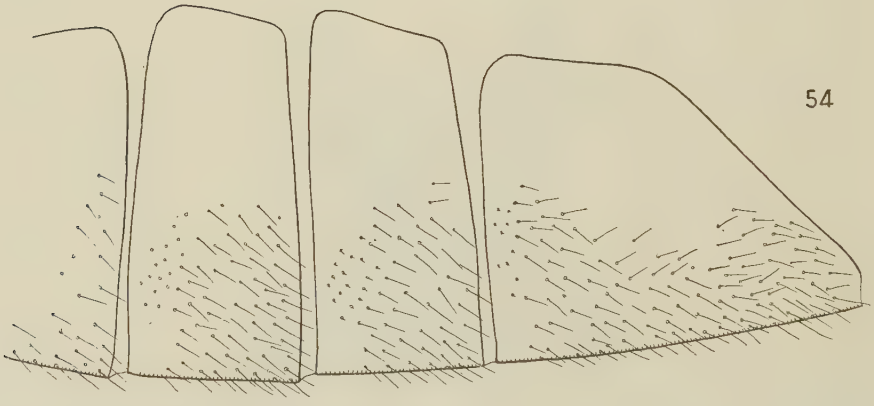
52

Fig. 52.—*Apanteles gonopterygis* Marshall; basal tergites, ♀.

apically or at least at extreme apex, middle tibiae (save commonly for some darkening in apical half), basal half or three-fifths of hind tibiae, and the basal joint of the hind tarsi basally, red testaceous; palpi and all tibial spurs red testaceous or pale red testaceous; there is a small, obscure, red testaceous marking below on the hind legs at extreme base of femora and extreme apex of trochantines; wings of ♀ slightly infumated, and the setae coloured, of ♂ hyaline and the setae colourless; wings in ♀ with the outer part of the costal veins, the 1st abscissa of the medial, and the anal vein, red testaceous, and with the



53



54

FIGS. 53 & 54.—*Apanteles gonopterygis* Marshall: 53, genitalia, ♀; 54, apical ventrites, ♀.

basal vein, 1st abscissa of cubital, and recurrent, red-brown, in the ♂ with all the above parts red testaceous; stigma, metacarp, and wing-veins otherwise, brown; stigma uniformly opaque.

♀♂. *Head*: face, clypeus, and frontal orbits, closely, minutely punctate (degree 3); frons and vertex minutely punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ shorter than combined length of head, thorax, and abdomen, longer than combined length

of thorax and abdomen, of ♂ equal to combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout minutely (degree 3) punctate, the punctures so closely placed and of such a nature as to give the impression of fine, minute rugosity; the lines of the notauli not, or but hardly, apparent; disc of scutellum minutely punctate, but not so strongly or so closely as on the mesonotum; propodeon as a rule noticeably more strongly sculptured in ♀ than in ♂, in ♀ reticulately rugose and with a well-marked, even quite strong, median longitudinal carina, in ♂ with weak reticulate rugosity and with the median longitudinal carina weak or even obsolete. *Legs*: hind coxae above in basal half with strong punctation (degree 4), otherwise above and on outer faces minutely punctate; hind tibial spurs equal in length, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 52, 53 and 54): 1st tergite in basal half excavate, shining, and virtually entirely smooth, in apical half or two-fifths turned over and rugosely punctate; 2nd tergite rugose but not so strongly or definitely as apical half of 1st tergite, its median length rather variable, and consequently also rather variable is the angle of curvature of the discal sulci, which in any event are not strongly marked; 3rd tergite smooth and shining, minutely punctate save across base and apex and in a triangular median basal area; succeeding tergites minutely punctate; ventrites without median longitudinal suture; ovipositor sheaths considerably shorter than the basal joint, rather shorter even than the combined length of the 2nd and 3rd joints, the ovipositor longer than the basal joint, equal to the combined length of the 2nd, 3rd, and 4th joints, of the hind tarsus; hypopygium at extreme apex below rounded, but this area very membranous and indefinite so that the hypopygium might well be described as cut away at apex to form a small lower-apical margin.

Length, 2·5–3·0 mm.

Redescribed from the following material:—British Museum: Lyle Collection, New Forest, 2 ♀♀, 1 ♂, 7.iii.1910, 12.iii.1910 (*all forced*), Lyle ser. nos. 415, 418, 419, 420, 1 ♀, 2.v.1916, ser. no. 2862, 2 ♀♀, 16.v.1916, ser. no. 2880, 2881 (*G. T. Lyle*), all det. Lyle as *gonopterygis*. Bignell Collection: a card of three (2 ♀♀, 1 ♂). A. C. W. Wagner's Collection: Schwarzen Beck, 1 ♀, 9.iv.1922. D. S. Wilkinson's Collection: England, Chiddingfold, Surrey, 6 ♀♀, 2 ♂♂, pup. July 1935, em. June 1936 (*D. S. Wilkinson & P. E. Ward*), 37 ♀♀, 32 ♂♂, pup. vi.–vii.1936, em. v.1937 (*D. S. Wilkinson & R. L. E. Ford*), 26 ♀♀, 29 ♂♂, pup. vi.–vii.1936, em. v.1937 (*D. S. Wilkinson & P. E. Ward*).

Type in the Bignell Collection.

Host. Marshall originally described this species as a parasite of the Pierid butterfly, *Gonepteryx rhamni* L.; and from this host was bred all the material to which I have referred above.

We have had some experience with this host and parasite in the south of England. Young caterpillars of the host are to be found abundantly in certain woods on isolated trees of buckthorn, *Rhamnus frangula* L., in the second half of June; and in late June and early July the parasite has emerged from its host and has pupated. The *Apanteles* remain in the pupal state until the following year, the adults emerging in May or early June. In the whole of our experience not a single specimen emerged in the summer, to attack some alternative host.

Only young caterpillars are attacked; we have never bred *Apanteles gonopterygis* from three-quarters or fully grown *rhamni* larvae. The parasite is solitary. Lyle says that when a larva of *rhamni* is about to evacuate its parasite it will be noticed to have assumed a lighter colour, to remain extended on a twig of the food-plant without attempting to take food, and that this position is maintained for two or three days before the emergence of the parasite.

Cocoons. As Lyle has also remarked, the *Apanteles* larva, before commencing to spin its cocoon, loosely attaches to the twig the caterpillar from which it is emerging, and then constructs the cocoon beneath. The host caterpillar, which dies almost immediately, eventually falls to the ground, but leaves the strands of silk by which it was attached standing out from the cocoon in the form of a tuft. This tuft is fan-shaped, runs transversely across the cocoon, and gives it a very distinctive appearance. The cocoon is very firmly attached to the twig, and in colour is bright orange, as are also all the strands of silk.

Commentary. Marshall originally described this species from the female only, stating " Trois exemplaires m'ont été communiqués par M. Bignell, comme ayant été élevés par M. Courtice de *Gonopteryx* [sic] *rhamni* L. Coque d'un jaune testacé, couverte d'un réseau de filaments confus, soyeux et luisants." In the Bignell Collection, as I have shown above, is a card of three specimens together with a single cocoon. These are labelled, on the underside of the card, " Bred from *Gonopteryx rhamni* ", and " Described by Marshall in André's work Des Braconides ". The card also bears a red type label, as many other cards do in this collection, affixed by whom I do not know, but in this case correctly since these three specimens are quite obviously to be accepted as the original series despite one being a male; and I have so labelled them. This one male has had its abdomen compressed so that the genitalia are extruded and, under a low-power lens, look very much like female parts. The three specimens, and the cocoon, are quite typical and agree perfectly and in the minutest detail with all the other material before me.

It is to be remarked that these three original specimens had once been pinned, a pin-hole through the mesonotum showing in each; and the twig on which is the cocoon has a small pin.

Apanteles lineola Curtis.

Microgaster lineola Curtis, 1830, *Brit. Entom.* **7** : no. 321; 1860, *Farm Insects* : 81. Haliday, 1834, *Ent. Mag.* **2** : 252.
Apanteles lineola Curtis, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 164; 1888, *Spécies Hymen. d'Eur.* **4** : 407.

♀♂. Black;[3] palpi and tibial spurs pale; legs red-testaceous, except that the coxae, trochanters, and trochantines are black or at least strongly darkened, and that large portions of at least the hind tarsi, the apical third of the hind tibiae, and occasionally some portions of the hind femora, are slightly darkened; the uniformly opaque stigma,[4] and all wing-veins, dilute ferrugineous; wings hyaline.

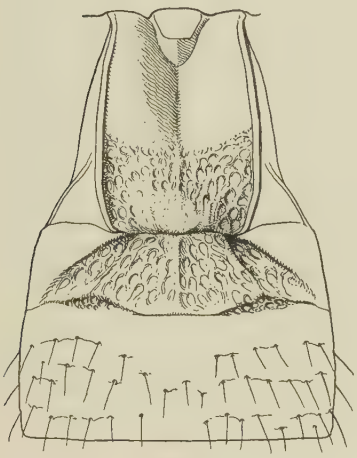
♀♂. *Head* : facial depressions large, clearly nearer to apex of clypeus than to the eyes; occiput rather strongly setiferous; antennae of the ♂ longer, and of the ♀ shorter, than the combined length of head, thorax, and abdomen. *Thorax* : mesonotum regularly punctate (degree 2), and the lines of the notauli not even indicated; scutellar sulcus broad, deep, nearly straight, and with at least ten regular, evenly spaced crenulations; disc of the scutellum with some scattered punctures; the lower, non-excavate area of the lateral faces of the scutellum not large; propodeon (fig. 57) right across basal half, and apically in about the medial third, finely rugose, in each lateral third of the apical half slightly excavate and more or less smooth; there is a very weak median longitudinal carina in about the basal third, and some indication of transverse basal carinae. *Legs* : hind coxae basally above

[3] Only old material is available, making the re-description of the colour very difficult to draw up.

[4] This colour of the stigma and wing-veins may well be due to age, despite Haliday's description. I have seen such coloration in the wings in old material of other species, where recent material of clearly the same species has these parts decidedly darker.

often with some strong punctures (degree 3–4), elsewhere minutely punctate; hind tibial spurs subequal, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 55 and 56): 1st tergite smooth, shining, and excavate in about the basal three-fifths, its apical two-fifths weakly turned over and with scattered, indefinite punctation; 2nd tergite weakly, indefinitely rugose, with its sulci well marked except at apex; 2nd suture nearly straight; 3rd tergite with two or three transverse rows of minute punctures (degree 1), otherwise smooth, considerably longer than the 2nd (14 : 9); succeeding tergites with only minute punctures; the hypopygium just slightly rounded, nearly truncate; ovipositor sheaths short and stout.

Length, 2·25 mm.



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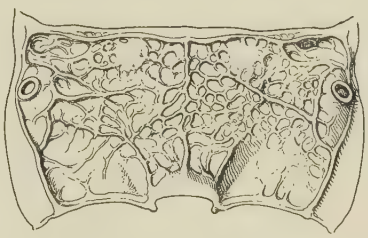

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Fig. 55.—*Apanteles lineola* Curtis; basal tergites, ♀.

Figs. 56 & 57.—*Apanteles lineola* Curtis: 56, apex of abdomen, lateral, ♀; 57, propodeum, ♀.

Redescribed from 5 ♀♀, 1 ♂, on a card together, from the Curtis Collection, undated, labelled "Dover".

Type series in the Melbourne Museum.

Host. Stated to be larvae of the Syrphid fly, *Scaeva*, now known as *Catabomba pyrastri* L.

Cocoons pure white.

This species was originally described by Curtis in a couple of lines; but by Haliday a year or so later more amply. Neither author, as usual, gave the number of specimens from which his description was drawn up. Curtis, however, seems to have had quite a few, for in his book *Farm Insects* he says: "The maggots of this species (namely the Syrphid host) are green and I found them in July, 1829, in some abundance on the sea-cabbages, *Brassica oleracea*, which grow under the cliffs near Dover. Many of them had been stung by a little parasitic fly called *Microgaster lineola*, the maggots of which came out of the *Scaeva* larvae, and formed little elliptical silken cocoons almost white."

In the Curtis Collection in the Melbourne Museum was a single cardful of

specimens standing over the name *lineola*; and this was kindly lent to me for examination. These specimens, in all six, as stated above, together with white cocoons, are in my opinion unquestionably the original series, or part of the original series, from which Curtis described his species, since, written on the underside of the card, in handwriting that compares perfectly with that of the letters from Curtis to Haliday now in the possession of the Royal Entomological Society of London, are the following words :—" Out of caterpillars of *Syrphus pyrastri* feedd. upon *Brassica oleracea* Dover ", with the addition of one or two letters that I am unable to decipher.

Haliday's description does not agree with these six specimens, in that the 3rd tergite is not aciculated. I do not attach much importance to this, however, since Curtis, with his usual carelessness, might well have selected for Haliday's examination specimens of some other species. Or Haliday himself might have made some mistake. But whatever the cause of Haliday's error, the result has been unfortunate, as *lineola* has been unrecognised on this account until now. Reinhard (1880 : 367), on the basis of the aciculated 3rd tergite, referred the species to *solitarius* Ratz., but doubtfully, on account of the Syrphid host; and Marshall inclined to follow Reinhard. All other authors have ignored the species.

Marshall (1885) noted that in the Walker Collection, at Oxford, were two females and one male, numbered 104, and ticketed *lineola*; but that he had not been able to examine them. I have seen these specimens. The male (?) is a *Microplitis*, and the two females are what is understood at the moment to be *falcatus* Nees !

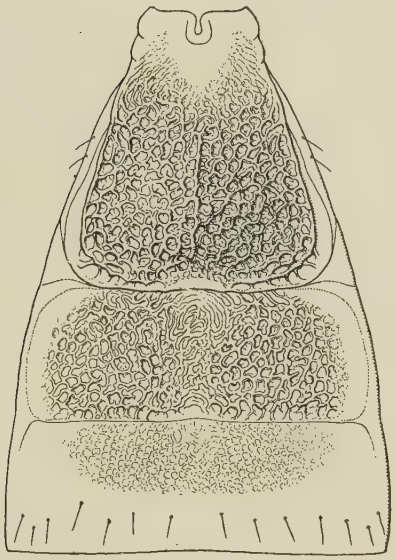
That the host of *lineola* is a Syrphid larva is, undoubtedly, unusual. I do not think, however, that Curtis' record can be treated lightly, since in one or two recent instances species of *Apanteles* have been bred, by careful and well-known workers, as parasites from hosts other than Lepidopterous larvae.

Apanteles ferrugineus Marsh.

Apanteles ferrugineus Reinhard MS., Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 170; 1888, *Spécies Hymen. d'Eur.* **4** : 413. Bridgman, 1888, *Ent. mon. Mag.* **25** : 67. Billups, 1888, *Proc. S. London ent. Soc.* **1888** : 22.

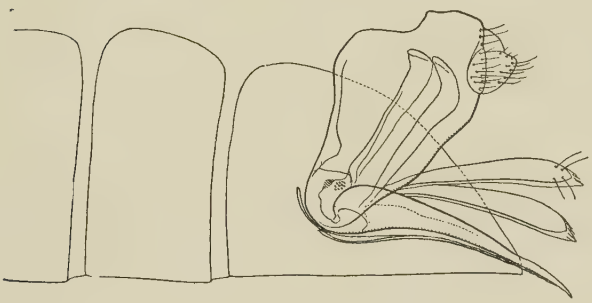
♀♂. Red testaceous or red; the head, certain small portions of the mesopleurae and mesosternum, the metathorax, propodeon, 1st tergite, 2nd tergite to a certain extent, feet, and ovipositor sheaths, black; abdomen apically darkened to strongly darkened, in the smaller specimens even black; flagellum darkened; wings distinctly infumated evenly throughout, the setae coloured; wing-veins, stigma, and metacarp, testaceous or red testaceous; stigma uniformly throughout more or less transparent.

♀♂. *Head* broader than mesonotum; face swollen, particularly above, with the clypeus minutely punctate (degree 2 or 3) throughout; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 2 or 3); posterior ocelli considerably nearer to each other than to the eyes; flagellum of ♀ with length equal to the combined length of thorax and abdomen, of ♂ to the combined length of head, thorax, and abdomen. *Thorax* to some extent compressed dorso-ventrally; mesonotum, disc of scutellum, and propodeon anteriorly, more or less on the same plane; mesonotum throughout strongly punctate (degree 4); disc of scutellum almost entirely smooth; propodeon in at least the basal half with a median longitudinal carina, which is variable in strength; the medial two-thirds of the propodeon rugose or closely rugoso-reticulate, the lateral margins of this area often delimitated by the rugosities being raised somewhat to form a rugose, of course longitudinal, weak ridge; outside this ridge, on each side of the propodeon,

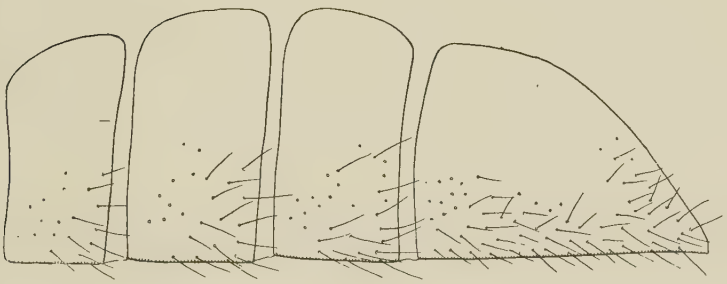


58

FIG. 58.—*Apanteles ferrugineus* Marshall; basal tergites, ♀.



59



60

FIGS. 59 & 60.—*Apanteles ferrugineus* Marshall: 59, genitalia ♀; 60, apical ventrites, ♀.

formed by the ridge and the usual lateral longitudinal carinae, which latter are very strong, is a broad, of course longitudinal, channel, in which the spiracle is situated; this channel is smooth with a very coarse reticulation. *Legs*: hind coxae rugose; hind tarsi equal in length to hind tibiae; hind tibial spurs equal, two-fifths the length of the basal joint of the hind tarsus. *Abdomen* (figs. 58, 59 and 60): 1st tergite perhaps in extreme base slightly excavate and to some extent smoother, otherwise throughout evenly turned over and rugose or closely rugoso-reticulate, often with a rugose median longitudinal carina in its middle third, but with the shape of its plan very variable; 2nd tergite rugose, but not quite so strongly as the 1st; 2nd suture well marked; 3rd tergite in about the basal half with fine rugosity, which is variable in extent and strength, otherwise smooth save for a single row of very well-separated, minute (degree 1) punctures across the apical half; 4th and succeeding tergites smooth, save for a single row of very well-separated, minute (degree 1) punctures across the apical half; ventrites of ♀ without median longitudinal suture; ovipositor sheaths about two-thirds the length of the basal joint of the hind tarsus; hypopygium acute.

Length, 1·75–3·25 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a card of four (4 ♀♀); Lyle Collection, 2 ♀♀, 1 ♂, Leicestershire, ser. nos. 4529, 4530, 4531, ex Coll. A. Matthews. Bignell Collection: a cardful of six (6 ♀♀), ser. no. 1426, for which the register gives the date 30 June 1883; a cardful of twelve (11 ♀♀, 1 ♂), 24.vi.1892; and a cardful of six (5 ♀♀, 1 ♂), without data (apart from host). Bridgman Collection: 4 ♀♀, ser. no. 993, for which his register gives Wicken Fen (*W. H. B. Fletcher*). Fitch Collection: a cardful of twenty-nine.[5] Zoologisches Museum der Universität, Berlin: Berlin, 5 ♀♀, 5 ♂♂, 18.v.1904 (*K. Heyn*), 4 ♀♀, iv.1909 (*Lichtwardt*). A. C. W. Wagner's Collection: Bergedorf, 3 ♂♂, 22.vii.1909, x.1909, ser. no. 26. D. S. Wilkinson's Collection: Wicken Fen, 1 ♀, 7.viii.1931 (*G. J. Kerrich*), Wicken, 20 ♀♀, 1 ♂, undated (*F. S. J. Hollick*).

Type in the Collection of the Essex Field Club (Fitch Collection), The Essex Museum of Natural History, Stratford, London.

Host. This species was originally described by Marshall, from the material in the Fitch Collection, to be parasitic on the Pyralid, *Chilo phragmitellus* Hübn., and from this host also are recorded the cardful of twelve and the cardful of six without data in the Bignell Collection, and the German series bred by Heyn: while the series in my own collection is labelled to have been bred from *Phragmites*, and consequently almost certainly also from this host. The four specimens in the Bridgman Collection are those referred to by him and Billups in 1888, and are recorded from the Cossid, *Macrogaster arundinis*, now known as *Phragmataecia castaneae* Hübn., while Wagner's material is labelled by him to have been bred from the Agrotid, *Nonagria geminipuncta* Haw. The remainder of the material from which I have redescribed this species is without host record, save that the German series of Lichtwardt is labelled to have been bred from an unknown species of the Agrotid genus *Leucania*, a record that might well be due to misidentification.

Cocoons white, papyraceous, more or less transparent, to be found singly or in small groups inside the reed-stem.

Commentary. Marshall originally described this species as "Apanteles ferrugineus, Reinh. MS", and stated that it had been "discovered by Porritt, who reared many from the larvae of *Chilo phragmitellus* Hübn., inhabiting the

[5] Many so damaged that the sex is indeterminable; others represented only by a leg or so, or a wing; some in quite good condition.

interior of reeds " and that " 29 are preserved on one card ". The material in the Fitch Collection, which clearly originally comprised twenty-nine specimens, is labelled " *Apanteles formosus*—ex *Chilo phragmitellus*—G. T. Porritt ", and, on the usual yellow label, " *ferrugineus* Reinh. MS ". It is quite obvious that this cardful of twenty-nine is the series to which Marshall was referring in his original description, and, since mention was made of no other material, from which the type should be selected : and I have indicated one of the specimens as the type.

The reason why Marshall originally described the species under the qualifying term " Reinh. MS " is now clear, and is indeed further proof that this cardful of twenty-nine specimens is Marshall's original material. As I have shown in my commentaries on other species, Fitch was in communication with Reinhard, who returned this material to his correspondent, Fitch, pointing out that it was a new species and suggesting the obvious name *ferrugineus*. But whether or no Reinhard ever intended to describe the species, or whether Marshall imagined that Reinhard would at sometime describe it, or whether Marshall described it with the qualifying words " Reinh. MS " purely out of courtesy to the man who had been the first to recognise the species to be new to science, I do not know.

The two specimens in the Reinhard Collection are labelled type. This is absurd : Reinhard never wrote on the species.

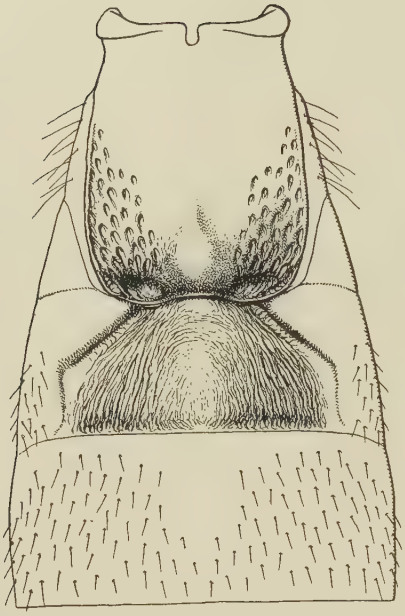
Apanteles popularis Hal.

Microgaster popularis Haliday, 1834, *Ent. Mag.* **2** : 250.
Apanteles popularis Haliday, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 213–214; 1888, *Spécies Hymen. d'Eur.* **4** : 475–476. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 675. Lyle, 1916, *Entomologist* **49** : 272; 1926, *Ent. mon. Mag.* **62** : 268. Daviault, 1929, *Bull Soc. zool. Fr.* **54** : 120–123. Cameron, 1935, *J. Ecol.* **23** : 291–293.

♀. Black; about the apical two-thirds or half of the front femora, the front tibiae, the front and middle tarsi (save for the darkened or black apical joint and feet), about the basal half of the middle tibiae, the middle femora at least at extreme apex and commonly extensively at apex and along the sides in apical half, the middle trochantines to some extent or even wholly, the hind trochantines to some extent and the hind femora at extreme base below, the hind tibiae in about the basal half or two-thirds, and often the membranous portions of the basal tergites, red testaceous; the middle tibiae in about the apical half variable from but slightly darkened to black; palpi (save for the basal joint) and tibial spurs pale; wings faintly infumated evenly throughout, the setae of the hind-wings throughout, and of the fore-wings in about the basal half, colourless, of the fore-wings in the apical half coloured; wings with the stigma, metacarp, considerable portions of the costal veins, the radial, transverse cubital, and 2nd abscissa of the cubital, brown, the majority of the remaining veins much paler or even colourless; stigma uniformly opaque.

♂. Agrees well enough with the description of the colour of a dark female, except in the wings; wings hyaline and the setae white, but apparently as commonly describable as in the female, and with all the grades intermediate between these two extremes; stigma, metacarp, and wing-veins as in the female, or rather darker; stigma uniformly opaque.

♀♂. *Head* : face, clypeus, and frontal orbits, closely minutely punctate (degree 2); frons and vertex minutely punctate (degree 1); facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ about equal to combined length of thorax and abdomen, unquestionably shorter than combined length of head, thorax, and abdomen, of ♂ longer than combined length of head, thorax, and abdomen, but shorter than combined length of thorax and abdomen together with twice the length of the head. *Thorax* : mesonotum closely, minutely (degree 2)



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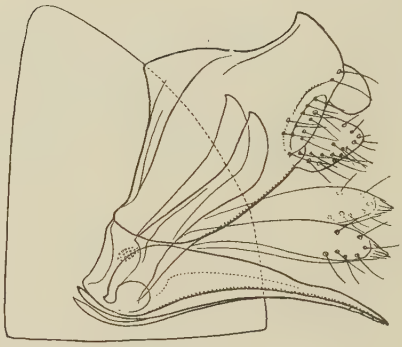

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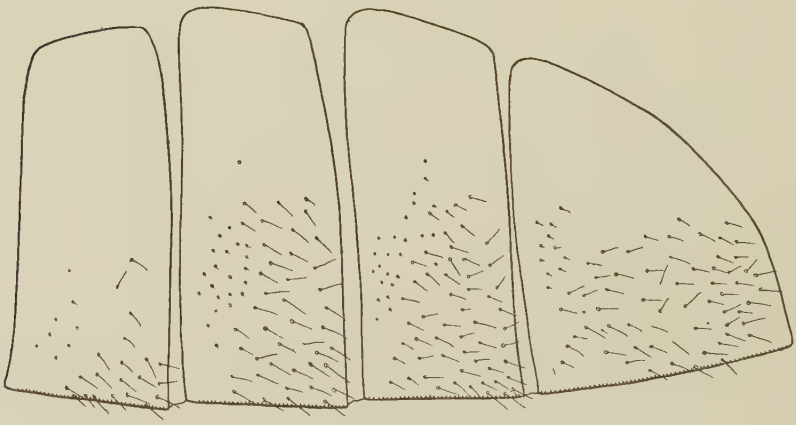

63

Fig. 61.—*Apanteles popularis* Haliday; basal tergites, ♀.

Figs. 62 & 63.—*Apanteles popularis* Haliday: 62, genitalia, ♀; 63, apical ventrites, ♀.

punctate throughout, across apex anteriorly to the scutellar sulcus more minutely and more sparsely punctate; scutellar sulcus virtually straight; disc of scutellum punctate throughout (degree 3), the punctures along lateral margins closely placed, elsewhere more widely or even sparsely placed; propodeon in about the basal half of the medial third (which is at least flattened, and is commonly slightly excavate) and throughout the apical angles entirely smooth and highly shining, the remainder of the medial third largely occupied with long crenulations emanating from the apical lunule, the propodeon otherwise with fine, longitudinal and oblique striation or aciculation which has amongst it some irregularly placed setiferous punctures. *Legs*: hind coxae above in the basal half punctate (degree 3 or even 4), otherwise above and on outer faces with regularly placed, well-separated, minute punctation; hind tibial spurs equal in length, about four-sevenths the length of the basal joint of the hind tarsus. *Abdomen* (figs. 61, 62 and 63): 1st tergite in basal half excavate, in about the apical third or fourth turned over, broadly down lateral margins (save basally) and across apex punctate (degree 3 or even 4) and with striation also exhibited commonly across apex, otherwise entirely smooth and highly shining, with the apical angles strongly depressed, the lunule strongly in evidence, and the apex emarginate; but there is much variation in extent and strength of the sculpture generally; 2nd tergite throughout with longitudinal aciculation or striation, and with minute punctation across in the apical half, its discal sulci broad, strongly marked, widely divergent, short, not reaching apex of tergite; the sculpture on this tergite also very variable, both in the angle of divergence and in the length of the sulci, and in the strength of the aciculation; 3rd tergite throughout with regularly placed, well-separated, minute punctation, save narrowly in the basal angles and across base and in a large median basal triangle where it is entirely smooth, but extent and density of this punctation very variable; succeeding tergites with the usual minute punctation; ventrites without median longitudinal suture; ovipositor sheaths considerably shorter than the basal joint, shorter even than the combined length of the 2nd and 3rd joints, the ovipositor equal in length to the basal joint, of the hind tarsus; hypopygium truncate at apex.

Length, 2·75–3·25 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a card of two (1 ♀, now the *neotype*, 1 ♂), det. as *popularis*; Lyle Collection, New Forest, a card of one (1 ♀), ser. no. 1923, 13.v.1912 (*forced*), a card of three (3 ♂♂), ser. no. 1978, 29.v.1912, a card of three (1 ♀, 2 ♂♂), ser. no. 1983, 4.vi.1912 (*G. T. Lyle*), all det. Lyle as *popularis*; France, Paris, 2 ♀♀, 1 ♂, 1927–28 (*L. Daviault*), det. Ferrière as *popularis*; England, Bexley, Kent, 40 ♀♀, 20 ♂♂, 20.vii.1935 (*R. L. E. Ford*). Bignell Collection: a card of four (2 ♀♀, 2 ♂♂), ser. no. 1596, 2.vii.1883, a card of six (2 ♀♀, 4 ♂♂), 14.vi.1886, all det. *popularis*. Fitch Collection: a card of four (2 ♀♀, 2 ♂♂), Bignell ser. no. 780 where dated 20.vii.1882, a card of four (4 ♂♂), 1882 (*R. M. Sotheby*), 1 ♀, ser. no. 19, all det. *popularis*. Harwood Collection: Tuddenham, a card of five (1 ♀, 4 ♂♂), a card of four (1 ♀, 3 ♂♂), a card of three (2 ♀♀, 1 ♂), v.1916, all det. as *popularis*. Manchester University Museum: Birkdale, Lancashire, 3 ♀♀, 2 ♂♂, 5.vi.1933, 7.vi.1933 (*L. Nathan*), det. as *popularis*. Dr. Ferrière's Collection: France, Paris, 1 ♀, 1927–28 (*L. Daviault*), det. Ferrière as *popularis*. Imperial Institute of Entomology: England, Bucks, Slough, 13 ♂♂ (*O. W. Richards*), 1 ♀, 26 ♂♂ (*O. W. Richards*); Langmere, Brecknockshire, 2 ♀♀, 1 ♂, 30.vii.1932 (*J. E. M. Mellor*), det. Ferrière as *popularis*; England, Goring, Oxon., 1 ♀, pup. 30.vii.1934, em. 23.vi.1935, ser. no. 36965 (*O. W. Richards*); England, Kent, Bexley, 1 ♀, em. 7.v.1937 (*R. L. E. Ford*).

Further material examined:—Imperial Institute of Entomology: Farnham Royal, England, 38 ♀♀, 40 ♂♂, 5.xi.1932, 17 ♀♀, 13 ♂♂, 15.xi.1932,

6 ♀♀, 18 ♂♂, 18.xi.1932, 6 ♀♀, 6 ♂♂, 9.xi.1932, 3 ♀♀, 8 ♂♂, 16.xi.1932, 13 ♀♀, 9 ♂♂, 10, 12, 14, 21, 22, 25.xi.1932, 3 ♂♂, 14.iii.1932, 3 ♂♂, 2, 7.xii.1932 (*E. Cameron*).

Type lost : *neotype* in the British Museum, Marshall Collection.

Host. Haliday's original description is without host record. Marshall, the first reviser, records the species as an habitual parasite of the Arctiid, *Euchelia*, now *Tyria, jacobaeae* L. ; and from this host all the material to which I have referred above is recorded to have been bred, with the exception of the single female in the Fitch Collection and the single female from Bexley, which are without host record. In addition to the bare host record there is often some further biological information with regard to these series : Lyle's single specimen no. 1923 is recorded to be " one of a large brood " ; Bignell, under his reg. no. 1596, says " in pupa ten months " ; while Mellor's material is labelled to have pupated on 1 July 1932, and the adults to have emerged on 24 April 1933.

Marshall gives some biological information about this *Apanteles*, but Lyle, Daviault, and Cameron, some of the material of all three of which authors is before me, have written more extensively on it. Lyle says :—" A common gregarious parasite . . . it is however much more plentiful in some seasons than in others. Of a large number of the larvae of the host collected in 1911, quite 60 per cent. produced the parasite; yet in 1910, some 200 larvae from precisely the same localities failed to yield me a single specimen. I have never obtained it from any other host. A single-brooded species, some eleven months being passed within the cocoon, pupation only taking place shortly before the appearance of the imago." Cameron, in his study of the natural control of ragwort, says :—" This parasite is gregarious, several larvae inhabiting a single *Tyria* caterpillar. The highest number found was fifteen, while the average was five. The adults emerge from their cocoons during the first weeks of July, and proceed to parasitise the early stages of the *Tyria* caterpillars. The larva, when fully fed (towards the end of July), emerges from the mature fifth stage *Tyria* caterpillar, and hibernates inside a tough, woolly, white cocoon, pupating shortly before the appearance of the imago."

Bignell, in addition to recording *jacobaeae* as a host, gives also the Geometrid *Eupithecia*, now *Chloroclystis*, *rectangulata* L., and the Notodontid *Dicranura*, now *Cerura*, *vinula* L. His material upon which this record is based is before me as I write; it is not referable to *popularis* Hal.

Other generic names that have been used for *Tyria jacobaeae* by various authors are *Euchelia*, *Hipocrita*, and *Callimorpha*.

Cocoons white and held loosely together. Lyle says he has never found them in the natural state, but that when the host is kept in confinement they are constructed on the surface of the ground or under dead leaves, etc., in irregular bunches, and are connected the one with the other by a few threads.

Commentary. Haliday originally described this species from the Hyndman Collection (" Mus. G. C. Hyndman "), from an unstated number of males, and without any host record. Mr. A. W. Stelfox has been successful in finding the Hyndman Collection, and in a letter dated 18 June 1937, he gives me the following information :—" I was in Lurgan yesterday and saw the collection of insects. There is no doubt it is G. C. Hyndman's, but it now, at any rate, contains no specimens of *Microgaster* that could be called types of Haliday's. There was a small box loose in a miscellaneous drawer which contained some *Apanteles* with the typical bunches of cocoons of *glomeratus* and *congestus* and there were a few of the former in the systematically arranged part of the collection correctly named; but there was no evidence that Haliday had even seen

any of them and no evidence that those in the small box had even been named at all. As regards dates you may be interested to learn that many of the aculeates and other hymenoptera bear dates of 1827 and 1829. I think you can safely say that in the remains of the Hyndman Collection in the Carnegie Library at Lurgan, Co. Armagh, there are now no *Apanteles* that show evidence of having been seen by Haliday. The drawer where the BRACONIDAE were arranged showed that the collection had at one time been much more extensive, but only space for *glomeratus* and one other '*Microgaster*' had been provided." The original specimens of Haliday's *popularis* are lost, therefore.

The first reviser of *popularis* Hal., is Marshall 1885. This author redescribed Haliday's species from an unstated number of both females and males, and remarked that it was common, gregarious, and an habitual parasite of *jacobaeae*. In the Marshall Collection under the name *popularis* were two specimens, a female and a male. Since these not only agree (well enough) with Marshall's description, but also agree perfectly and in the minutest detail with all the other material before me bred from the same host that Marshall records, they are obviously to be accepted as the series from which a neotype must be selected; and as may be seen above I have selected the female as the neotype, and so labelled it.

Apanteles liparidis Bouché.

Microgaster liparidis Bouché, 1834, *Nat. Ins.*: 152. *Apanteles liparidis* Bouché, Wilkinson, 1932, *Trans. ent. Soc. Lond.* **80** : 331.

Microgaster nemorum Hartig, 1838, *JBer. Forstwiss. forstl. Naturk.* **1**, heft 2 : 252. Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 69; 1848, *Ichn. d. Forstins.* **2** : 50; 1852, *Ichn. d. Forstins.* **3** : 51.

Microgaster liparidis Ratzeburg (*nec* Bouché), 1844, *Ichn. d. Forstins.* **1** : 70; 1848, *Ichn. d. Forstins.* **2** : 50; 1852, *Ichn. d. Forstins.* **3** : 51.

Glyptapanteles (*Apanteles*) *japonicus* Ashmead, 1906, *Proc. U.S. Nat. Mus.* **30** : 193. Wilkinson, 1932, *Trans. ent. Soc. Lond.* **80** : 331.

Apanteles (*Apanteles*) *posticae* Sonan, 1927, *Rep. Dept. Agric. Res. Inst. Formosa*, no. 29 : 111–112. Wilkinson, 1932, *Trans. ent. Soc. Lond.* **80** : 331.

♀♂. Black; the mandibles, tegulae, the four front legs entirely (save for the black feet), often portions of the extreme apex of the hind coxae, the hind trochanters and trochantines, hind femora (save for some slight darkening at apex), hind tibiae (save for some slight darkening in apical third), hind tarsi (save for some darkening and for the black feet), the membranous portions of the basal tergites, and the basal ventrites, red testaceous; palpi and hind tibial spurs pale; scape very variable, either red testaceous, dark red, strongly darkened, or black; wings hyaline, or perhaps slightly infumated evenly throughout, the setae coloured; the costal veins apically, stigma, and metacarp, light brown, as are also the radial and transverse cubital veins and other veins in the centre of the wing; veins in the basal portions of the wing colourless, with the costal veins red testaceous; stigma uniformly opaque.

♀♂. *Head*: clypeus and face throughout punctate (degree 3); facial depressions nearer to apex of clypeus than to the eyes; frontal orbits, frons and vertex, throughout minutely punctate (degree 1); posterior ocelli equidistant from each other and the eyes; flagellum of ♀ equal in length to or rather longer than combined length of head, thorax, and abdomen, of ♂ longer than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout with regularly spaced minute punctation (degree 2); disc of scutellum minutely punctate (degree 2 or 3), the punctures more widely spaced than on the mesonotum; propodeon with the apical lateral areas highly shining, entirely smooth (save perhaps for one or two obscure rugae), and occupying on each side the whole of the triangular area between the median apical lunule, the spiracle, and the apical angle, with the median triangle, the base of which is the base of the propodeon and the apex of

which is the median apical lunule, punctate (degrees 1, 2, or even 3) throughout save for a narrow, sometimes slightly depressed, median longitudinal area which is entirely smooth. The relative lengths of the 1st abscissa of the radial and of the transverse cubital variable so that these veins are either equal to one another or the radial noticeably longer than the transverse cubital. *Legs*: hind coxae, both basally above and on outer faces, throughout with regularly spaced minute punctation (degree 2); the longer hind tibial spur two-thirds, and the shorter spur half, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 64, 65 and 66): 1st tergite in the basal half excavate, smooth, and shining, in some more strongly sculptured examples punctate or rugose narrowly along some portions of the extreme lateral margins, in the apical half turned over and with the median longitudinal

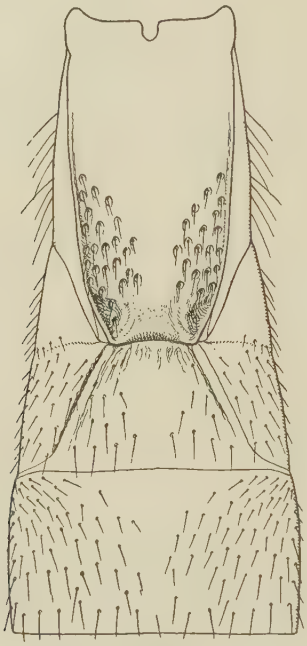

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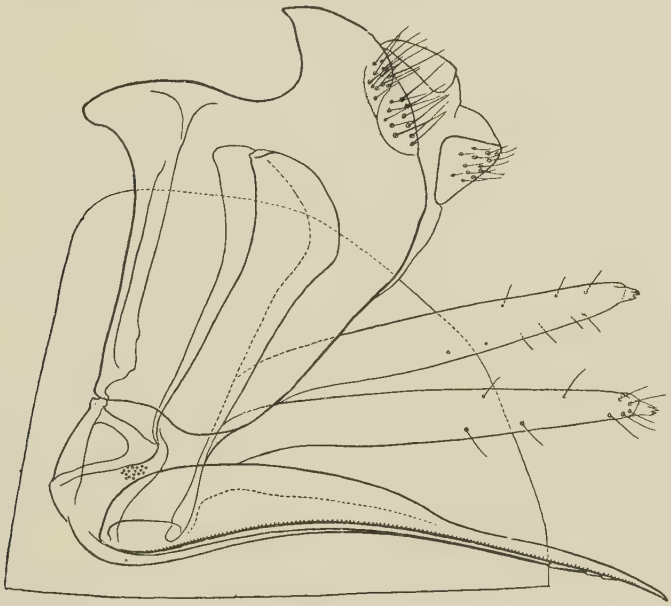
Fig. 64.—*Apanteles liparidis* Bouché; basal tergites, ♀.

third entirely smooth and the lateral longitudinal thirds strongly punctate (degree 4), the apical lunule entirely smooth, occupying quite one-half of the apical margin, and much in evidence since each lateral fourth of the apical margin is not only invariably depressed but, further, commonly exhibits in addition a strong punctiform impression; 2nd tergite with its discal sulci straight, or more or less straight, but not always very well marked, the disc smooth save for minute punctation in the lateral thirds and all across the apical third, and save, in some more strongly sculptured examples, for some weak or obsolete longitudinal aciculation alone in the neighbourhood of the discal sulci and occasionally across the extreme base; 2nd suture not always very well marked; 3rd tergite throughout minutely punctate (degree 1), this punctation more widely spaced than on the mesonotum, commonly entirely smooth narrowly across base and often in a rather broader median basal area; succeeding tergites throughout minutely punctate (degree 1); the 2nd and 3rd ventrites of ♀, and perhaps the 4th, with some indication of an obsolete median longitudinal suture; ovipositor sheaths longer than the basal joint of the hind tarsus, longer than the combined length of

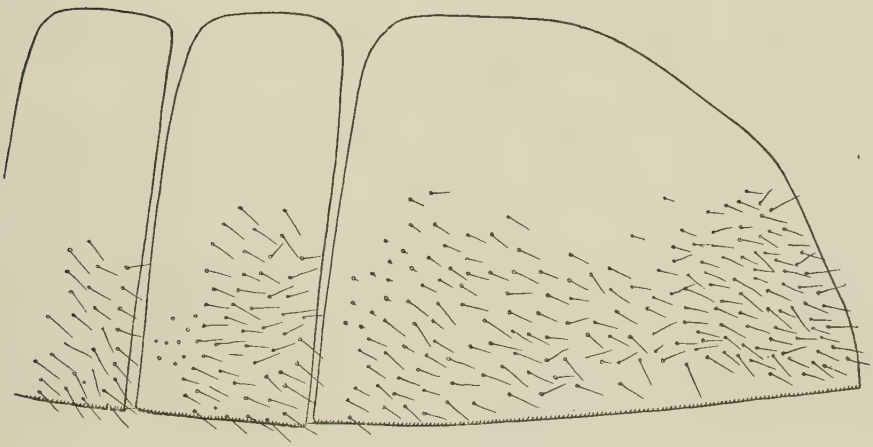
the 2nd, 3rd, and 4th joints, but shorter than the combined length of the basal and the 2nd joint; hypopygium truncate.

Length: ♀, 3·5–3·0 mm.; ♂, 3·0–2·5 mm.

Redescribed from the following material:—British Museum: Gawlowek, S.W. Poland, 3 ♀♀, 3 ♂♂, 6.x.1924 (*Keler*), det. Lyle as *liparidis*; Russia, 2 ♀♀, 2 ♂♂, 1909, ser. no. Gip. Moth Lab. 3137J, 1844, Kiev, Russia, 1 ♀, *undated*, Gip. Moth Lab. 3137, 1 ♂, 1908, Gip. Moth Lab. 1065, Germany, 2 ♀♀, 30.vii.1912, Gip. Moth Lab. 3425, 1 ♂, *undated*, Gip. Moth Lab. 3425, 5 ♀♀, 5 ♂♂, *undated*,



65



66

Figs. 65 & 66.—*Apanteles liparidis* Bouché: 65, genitalia, ♀; 66, apical ventrites, ♀.

Gip. Moth Lab. 3426, 1 ♂, 1909, Gip. Moth Lab. 3159Ag. 2, Japan, 2 ♀♀, Gip. Moth Lab. 3439, 2 ♀♀, 1 ♂, Gip. Moth Lab. 1074, 1 ♀, 1 ♂, Gip. Moth Lab. 3044, 2 ♂♂, Gip. Moth Lab. 3439, *all undated*, presented by the United States National Museum; Japan, 1 ♀, 1 ♂, det. Ashmead as *japonicus* Ashm.; Taihoku, 1 ♀, 23.v.1927, 3 ♂♂, 1.iii.1925, 20.v.1926, 23.v.1927, *cotypes* of *posticae* Sonan. Ratzeburg Collection: 1 ♂, ser. no. 127, 4 ♀♀, ser. no. 399, *type* series of *liparidis* Ratz., 4 ♀♀, 1 ♂, det. as *nemorum* Hartig. Zoologisches Museum der Universität, Berlin: Westpreussen, Heisternest. Leuchtt.-Hela, 15 ♀♀, 7 ♂♂, 16.viii.1904 (*Dr. G. Enderlein*), det. Enderlein as *nemorum* Hartig. Bundesanstalt für Pflanzenschutz, Wien: Ob. Püllendorf, Bgld., 7 ♀♀, 5 ♂♂, vi.1921, det. *liparidis* Bouché, 2 ♀♀, 1.vii.1932, det. *porthetriae* Mues. Universitetets Zoologiske Museum, Copenhagen: Weis Collection, Adserbo and Due Odde, 13 ♀♀, 5 ♂♂.

Further material examined:—Bouché Collection: Berlin, 1 ♀ (*type* of *liparidis*). Hartig Collection: 8 ♀♀, 7 ♂♂ (*type* series of *nemorum*).

Type of *liparidis* Bouché, in the Bouché Collection, Zoologisches Museum der Universität, Berlin; register serial number 13112. *Type* series of *nemorum* in the Hartig Collection, Zoologische Staats-Sammlung, Munich. *Type* of *liparidis* Ratz. (see Commentary) in the Ratzeburg Collection, Forstlichen Hochschule, Eberswalde. *Type* of *japonicus* presumably in the United States National Museum. *Type* of *posticae* presumably either in the collections of the Department of Agriculture, Formosa, or in Tokio.

Host. Bouché, Ratzeburg, and Ashmead, originally described their species as gregarious parasites on the Lymantriid moth now known as *Lymantria dispar* L.; and of the material seen by me, in addition to the types and other authentic material, all that noted below is recorded from this host, namely, all the material from Poland and Russia, the single male from Germany with serial number 3425, the Japanese material with serial nos. 1074 and 3044, the two Japanese males numbered 3439, and lastly the material from Vienna wrongly determined as *porthetriae*. *Apanteles nemorum* was originally described by Hartig as a gregarious parasite of "*Gasteropacha pini*," a Lasiocampid, now known as *Dendrolimus pini* L., a species that has been referred to by many under the generic names *Lasiocampa*, *Bombyx*, *Metanastria*, and *Lebeda*; and from this host is recorded that material in Berlin seen by me and referred to above and determined by Enderlein as *nemorum*, and also all the Danish material. *Apanteles posticae* was originally described by Sonan as a parasite of the Lymantriid, *Notolophus*, now *Orgyia*, *posticus* Walk.

Apanteles liparidis, throughout the palaearctic region one of the common parasites of *Lymantria dispar*, on account of the economic importance of its host, has a rather extensive bibliography. It must be remembered, too, that references to this species are to be sought not only under the Bouché name and the names of the other species that have fallen as synonyms, but also under the name *fulvipes* Hal.; for it is an unfortunate fact that numerous authors in the early days, notably Fiske and Howard & Fiske, have written under this latter name upon what in many instance was almost certainly *liparidis*. I have not, of course, been able to see all the material to which all these authors referred, and cannot, therefore, vouch for the determinations; but I am convinced that records of *Apanteles* on *dispar* or *pini*, or for that matter on other Lymantriids or Lasiocamps, should be referred to *liparidis* rather than to *fulvipes*. In this connection also it should be noted that the majority of the German and Japanese material, to which I have referred above as having been seen by me and as being in the possession of the British Museum, and bearing the United States

Gipsy Moth Laboratory serial numbers, bears the determination label "*fulvipes* Hal."; and Muesebeck, in his letter to me when he advised despatch of some of this material for presentation to the British Museum, says :—" This lot is from material reared at the Gipsy Moth Laboratory many years ago and represents the species which was referred to by Howard and Fiske, as well as others, under the name *fulvipes* Haliday. I am thoroughly convinced that this is the true *liparidis* and that Watanabe was altogether correct in placing *fulvipes* Howard & Fiske, as well as *japonicus* Ashmead, in synonymy under *liparidis*. I should say that part of the series which I am sending you consists of specimens from Japan which agree exactly with Ashmead's types of *japonicus*. Unfortunately there are but few specimens in the type series and these are not in good condition. Otherwise I would send you one of them."

Fiske (1910) and Howard & Fiske (1911) show that this *Apanteles* is spread throughout the palaearctic region as an important parasite of *dispar*. They give an account, also, of the early efforts to introduce it to America from Japan. All these efforts failed, and the authors suggest that such failure was due to the absence in America of an absolutely necessary alternative host. Amongst other interesting statements, further, they recount that near Kiev in 1910 *dispar* was almost exterminated by this parasite; and such conditions have also been reported by Emelianov (1906).

Such an alternative host as was envisaged by Howard & Fiske has been reported and discussed more recently by Burgess & Crossman (1929), who say, when writing on this parasite under the name *liparidis* :—" The gipsy-moth alone will not sustain this parasite, for it requires another insect in which to hibernate. . . . While J. N. Summers was investigating the gipsy-moth situation in Japan, he found *Apanteles* larvae issuing from caterpillars of *Dendrolimus spectabilis* Butl., at Nishigahara. This discovery established the fact that *D. spectabilis* is the hibernating host of this braconid in Japan. In Europe the species is recorded as a parasite of *D. pini*. . . . While visiting a pine-forest near Valencia, Spain, in March, 1924, nearly all stages of caterpillars and even an occasional pupa of *D. pini* were found, showing the variety of stages which *Apanteles* may choose as suitable ones in which to pass the winter. Undoubtedly this species is a favorable hibernating host for *A. liparidis* in Europe." Burgess & Crossman record also that in addition to being one of the most important parasites of *dispar* in Europe and Japan and widely distributed throughout the Old World, this species is reported as a parasite of the Lymantriid *Nygmia*, now *Euproctis*, *phaeorrhoea* Haw.; that in a medium-sized larva of *dispar* from 15 to 20 parasitic larvae develop from a single oviposition, but that caterpillars are commonly attacked more than once so that from 80 to 100 parasites are sometimes obtained from large specimens; and that as far as is known *liparidis* is not established in New England despite having been liberated in large numbers, and that the work that has been done on it indicates it cannot be established at the present time unless the host in which it hibernates becomes established first.

Other authors who have written on or otherwise referred to this species, under the name *fulvipes*, and as a parasite of *dispar* and/or *pini*, are Averin (1913), Barsacq (1913), Britton & Ashworth (1923), Burgess (1924), who also gives *Euproctis chrysorrhoea* L., as a host, Federov (1930), Ivanov (1899), Kamiya (1931), who, in addition to giving *dispar* as a host, describes all stages of the *Apanteles*, and records that it was observed to emerge from hibernating larvae of *Dendrolimus spectabilis* Butl., Kujima & Mori (1911), Meier (1927, 1929, 1934), who records in Russia from both *dispar* and *pini*, Mokrzecki (1913, 1914), Nunberg (1925), Summers (1923), in his paper on refrigerators for transporting

insects, and Vuillet (1910, 1911). A few authors have written on this *Apanteles* under the name *japonicus* Ashm., namely, Hayashi (1933), who records this species to be a parasite of the Lasiocampid *Malacosoma neustria* L., according to him a very common pest of cherry and plum in Central Honshu, Kamiya (1932), who gives it as a parasite of *D. spectabilis* Butl., Kuwayama (1929), and Matsumura (1932), who record it from *dispar*, and Okamoto (1921). Under the name *nemorum* Hartig, both Ratzeburg (1844) and Eckstein (1907) have written short biological accounts of the species as a parasite of *pini*, while Taschenberg (1880), Gauckler (1897), Guénaux (1917), and Lahn (1917), also all refer to this host. Ratzeburg both in 1844 and 1852 in his *Ichneumonen der Forstinsecten* records he obtained it *only* from *pini*. Under its correct name, *liparidis*, Watanabe (1932), in his important work, wherein the synonymy of this species (so far as it goes) agrees perfectly with that which I am publishing here, records another host in addition to those I have mentioned above, namely *Dendrolimus albolineatus* Mats., and in 1934 he added yet another, the Lymantriid, *Dasychira pseudabietis* Butl.; but I have seen none of this material from which these records have been made. Lyle (1925) also recognised *liparidis* as a parasite of *dispar*, the material that he saw (or anyway some of it) being the six specimens from Gawlowek to which I refer above; the other material, however, that at the same time he also referred to *liparidis* and the host of which was an Arctiid, is *Apanteles compressiventris* Mues. Writing in 1934, Kamiya (1934) says that *liparidis* is widely distributed in Japan, where it has four or more generations a year, of which the first and second attack *dispar*, and the last two *spectabilis*; and that the females outnumber the males when reared from this latter host, and the males outnumber the females when the host is *dispar*.

Cocoons. The cocoons of *A. liparidis* as a parasite of *dispar* are unknown to me, but Fiske (1910) illustrated them in a plate, which illustration has been extensively copied; and presumably agreed to. Burgess & Crossman (1929) say :—" Each larva prepares a white cocoon. . . . When a number of cocoons are clustered together, as is usually the case, they are quite conspicuous. They are found on the tree-trunks, and often the caterpillars from which the larvae issued are found partially entangled over the top of the mass of cocoons." This description and Fiske's illustration of the arrangement of the cocoons do not agree with my experience of them when this *Apanteles* parasitises *pini*. When *liparidis* attacks *pini* there are a great number of parasitic larvae in each host-larva, and the cocoons of the parasite in this case are placed all over the host-larva, from one side of the bark, or twig, to the other so that the host-larva is not only completely concealed, save only for its head and extreme posterior portions, but also firmly attached to the tree. Eckstein (1907) figured such cocoons also, but not very satisfactorily in that he made them too naked, whereas there is quite a fair amount of white, loose silk.

Commentary. Bouché originally described his *liparidis* from an unstated number of specimens of apparently the female sex only, and as a gregarious parasite of " *Bombyx* (*Liparis*) *dispar*." In the Bouché Collection is a single female labelled in the usual manner for this collection with five labels—" Berlin "; the serial number 13112; a red " type " label; the usual Stein label, " *liparidis* Bouch. * "; and with the usual Enderlein label, " *Apanteles liparidis* (Bouché) Type ". This specimen agrees perfectly with Bouché's original description, such as it is, and I am convinced that Stein and Enderlein were correct to accept it as the type of the species : it agrees, further, perfectly and in the minutest detail with all the material I have seen of this species bred from *Lymantria dispar*.

Hartig originally described his *nemorum* from an unstated, but apparently large, number of specimens of apparently both sexes, and as a gregarious parasite of "*Gasteropacha pini*." In the Hartig Collection in Munich under this name are four pinfuls of material. Of these, one pin has four females and four males, and another, four females and three males, and both these pins are labelled "*nemorum* m" on very old labels. These fifteen specimens agree perfectly with Hartig's description, and are obviously to be accepted as the original material. They are unquestionably referable to *liparidis* Bouché, agreeing with other material before me of this species perfectly and in the minutest detail.

The other two pinfuls of Hartig material referred to above have, respectively, one female and four males and two card-points with specimens missing, and one female *Apanteles* and seven hyperparasites, and are labelled, on much more recent labels, "*Microgaster nemorum* Htg [in ms.] Th. Hartig det. [in print]". This lot of material, which agrees perfectly with the other, is quite obviously authentic, but, just as obviously, is not the material from which the species was originally described. All of it, both this second lot and the original material, is in really very excellent condition.

Ratzeburg originally described his *liparidis*, in the first volume of his work, from an unstated number of specimens of apparently the female sex only, and as a gregarious parasite of "*Liparis dispar*." In the Ratzeburg Collection standing under this name, with the label written in his copper-plate handwriting, as was to be expected since the species was described in the first volume of his work, were three pins of insects. Of these pins, one, with a single male, bears a serial number, 127; another has two females and the serial number 399; the third, two more female *Apanteles*, a small mass of cocoons, a larva determined for me by Mr. W. H. T. Tams as *Lymantria dispar*, and the serial number 399 also. These five specimens of *Apanteles* agree perfectly with Ratzeburg's description and are obviously to be accepted as the original material; and I have so labelled them. They are unquestionably referable to *liparidis* Bouché, agreeing with other material before me of this species perfectly and in the minutest detail.

Ratzeburg in his *Ichneumonen der Forstinsecten* described this species, *liparidis*, and presented the name in such a way that one is forced to the conclusion that he was putting forward a new species, despite the fact that Bouché's work was quite obviously known to him. It was Ratzeburg's habit, when writing on his own species, never to put in the author's (his own) name; and throughout the three volumes of his work the name *M. liparidis* thus stands, bare, without reference to Bouché.

Ashmead originally described his *japonicus* from "many specimens in the National Museum . . . and from many additional specimens received by Dr. L. O. Howard . . .", but an unstated number, of both sexes, and as a parasite of "*Ocneria dispar*" in Japan. In the British Museum are a pair of specimens labelled as this species, a female and a male, Both specimens are labelled "Japan"; and "*Apanteles japonicus* Ashm., det Ashmead", and both agree perfectly with Ashmead's description. They were presented to the British Museum by the Imperial Institute of Entomology on exchange from the United States National Museum, and are clearly to be accepted as authentic material. They are unquestionably referable to *liparidis* Bouché, agreeing with other material before me of this species perfectly and in the minutest detail.

Sonan originally described his *posticae* from apparently an unstated number

of specimens, and as a parasite of "*Notolophus posticus*" attacking tea in Formosa. I wrote to Mr. Sonan, and was so fortunate as to be kindly presented with some specimens of his species. This material was presented, through the Imperial Institute of Entomology, to the British Museum, and comprises one female and three males. Each specimen bears a cotype label; a determination label, "*Apanteles posticae* Sonan"; and a locality label, "Taihoku", with a date, either 1.iii.1925, 20.v.1926, or 23.v.1927, all in ms., and at the bottom, printed, "Col. J. Sonan". These specimens are unquestionably referable to *liparidis* Bouché, agreeing with other material before me of this species perfectly and in the minutest detail.

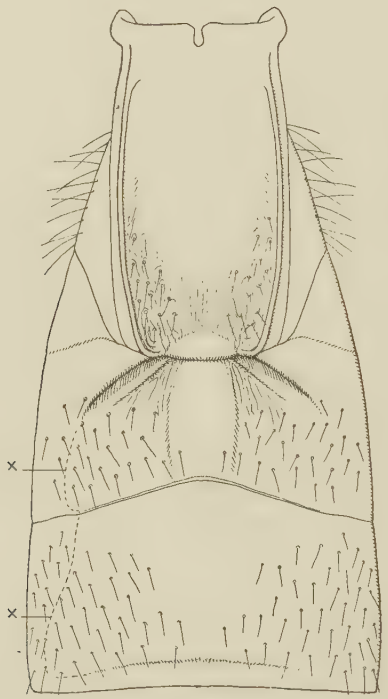


Fig. 67.—*Apanteles formosus* Wesmael; basal tergites, ♀.

Apanteles formosus Wesm.

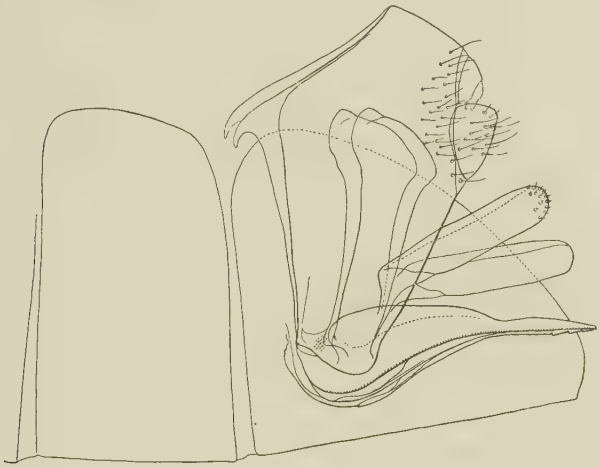
Microgaster formosus Wesmael, 1837, *Nouv. Mém. Acad. Brux.* **10** : 60.
Apanteles formosus Wesmael, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 218; 1888, *Spécies Hymen. d'Eur.* **4** : 480. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 661, 676; 1906, *Ent. mon. Mag.* **42** : 275. Lyle, 1917, *Entomologist* **50** : 195.
Apanteles marshallii Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 661; 1906, *Ent. mon. Mag.* **42** : 275. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 413 (**syn. n.**).

♀. Black; mouthparts, tegulae, the four anterior legs (including the coxae but excluding the feet), the hind trochanters and trochantines, the hind femora, the basal two-thirds of the hind tibiae, and extreme apex of the ovipositor sheaths, red testaceous; the 1st tergite, its lateral membranous margins, certain basal portions of the 2nd tergite, both the 2nd and 3rd tergite laterally, and quite the basal two-thirds of the venter, flavo-testaceous; hind tibial spurs pale; hind tarsi, apex of hind tibiae, brown; wings hyaline (or perhaps very

faintly infumated externally throughout), and the setae coloured; wing-veins, stigma, and metacarp, brown or dark brown; the stigma uniformly opaque.

Some individuals, including the majority of the British material, are rather darker than as described above, and have the apical half of the 1st tergite darkened or black, the 2nd tergite not testaceous basally, and the hind femora with a touch of black at apex above; or intermediately with one or other of these portions thus darker.

♂. Agrees with the above redescription of the colour of the ♀ except that the hind tarsi



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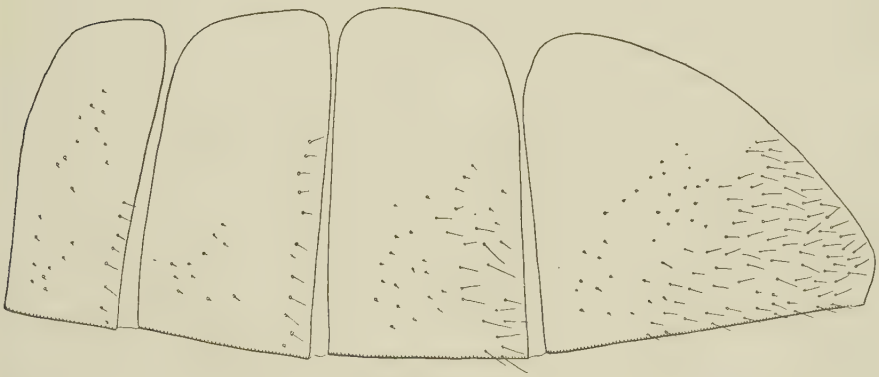

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FIGS. 68 & 69.—*Apanteles formosus* Wesmael: 68, genitalia, ♀; 69, apical ventrites, ♀.

and the apical third or half of the hind tibiae are dark brown, that the hind femora almost invariably have a black touch at apex above, that the 2nd and 3rd tergites are entirely black, and that the 1st tergite is invariably darkened or black in the apical half and often throughout (save for its lateral membranous margins).

♀♂. *Head*: face and clypeus throughout with regular, well-separated punctation (degree 3), otherwise smooth and shining; facial depressions rather nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli equidistant from each other and the eyes; flagellum of ♂ considerably longer than combined length of head, thorax, and abdomen, about equal to three times the length of the thorax, of ♀ rather

longer than combined length of head, thorax, and abdomen, about equal to combined length of thorax and abdomen together with twice the length of the head, or about 2·6 times the length of the thorax. *Thorax*: mesonotum smooth and shining, save for regular well-separated, minute punctation (degree 2) throughout which posteriorly it becomes increasingly more sparsely placed; scutellar sulcus crenulate, quite straight, or possibly slightly arcuate, but, if so, in the reverse way to the normal so that the apex of the mesonotum is slightly rounded and not slightly emarginate; disc of scutellum with widely placed, minute punctation, in shape almost an equilateral triangle, strongly tumescent and with all three sides steep so that the scutellum rises considerably above the level of the mesonotum; metathorax medianly tumescent; propodeon entirely smooth save for a large patch of minute punctures in the lateral thirds of the basal half. *Legs*: hind coxae regularly punctate throughout, on outer faces minutely (degree 3), basally above strongly (degrees 4 and 5), while in addition there is some aciculation apically above; the longer hind tibial spur at least three-fourths, and the shorter spur at least half, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 67, 68 and 69): 1st tergite in basal two-thirds excavate, smooth, and shining, in apical third turned over and down, and with some indefinite sculpture; 2nd tergite apically emarginate, with its sulci deeply impressed but present only in about the basal two-fifths, and with the entire length of about its medial fourth or fifth slightly raised and entirely smooth, the disc otherwise with well-separated, regular, minute punctation (degree 1); 3rd tergite with its medial length greater than that of the 2nd tergite, throughout with well-separated, regular, minute punctation (degree 1) save for a large, entirely smooth area which is roughly triangular in shape and the base of which is as broad as the extreme width of the base of the tergite, and situated thereupon, and the apex of which about reaches the medial point of the apex of the tergite; succeeding tergites with well-separated, regular, minute punctation (degree 1) as on the 2nd tergite, but with large areas entirely smooth; ventrites of ♀ without median longitudinal suture; ovipositor sheaths unusually short and stout, about as broad as, and only half the length of, the basal joint of the hind tarsus; hypopygium acute, cut away at extreme apex.

Length, 3·0–3·5 mm.

Redescribed from the following material:—British Museum: Marshall Collection, British Isles, 1 ♂, "Bred. Bfm. 1892," 1 ♂, "Bfm." France, 1 ♂ (?), "Mtpellier." Bignell Collection: 1 ♀, ser. no. 87, labelled "marshalli, Bign. MS."; and 1 ♂, ser. no. 87a, 3 May 1880. Zoologisches Museum der Universität, Berlin: 43 ♀♀, 19 ♂♂, 7 ?, xi.1899 (*Ude*). Imperial Institute of Entomology: Brondesbury, London, 2 ♀♀, 1 ♂, v.1935 (*E. Classey*).

Type in the Musée Royal d'Histoire Naturelle, Brussels; register serial number 2013. Type of *marshallii* Bign., in the Bignell Collection; serial number 87.

Host. Wesmael's specimen is without host record. The ♂ in Bignell's collection numbered 87a is recorded on the underside of the card to have been bred from the Geometrid *Ourapteryx sambucaria* Dup., a name now sunk under *O. sambucaria* L. Also, on page 676 of his paper published in 1901 (*Trans. Devon. Ass. Adv. Sci.* **33**) Bignell has stated that *formosus* was bred several times in 1882 from this host; and on page 275 of his paper of 1906 (*Ent. mon. Mag.* **42**) he records that both sexes were sent to him by Mr. R. C. Bradley, also from this host. Bignell further records (1901, *Trans. Devon. Ass. Adv. Sci.* **33**) that he obtained *formosus* from the Geometrid *Hybernia*, now *Erannis*, *marginaria* F. The source of the specimens in the Marshall Collection is obscure, and they are without host record. The material from Brondesbury is labelled to have been bred from the Geometrid *Abraxas grossulariata* L., and the long German series bred by Ude, from *Abraxas sylvata* Scop.

The unique specimen described by Bignell as *marshallii*, namely that specimen referred to above in his collection with serial number 87, was recorded by Bignell to be parasitic on the Agrotid *Taeniocampa*, now *Orthosia*, *stabilis* Schiff. I consider, however, that this record is incorrect; and I discuss my reasons for this statement in the Commentary which follows.

Cocoons pedunculated, pale greenish-buff. As Marshall has remarked, the cocoons of this species are entirely unlike anything constructed by a Braconid, and rather resemble the pedicellate egg of a *Chrysopa*. Lyle also remarks (1917) that they bear a likeness to the pensile cocoon of a Meteorid, and that one would naturally suppose they were constructed in a similar manner, namely, by the larva first suspending itself by strands of silk from a leaf or twig and then weaving its cocoon. Bignell, however, assures us (1901 and 1906) that this is not so, but that on the contrary the larva, after making at the base a silken pad on the upper surface of the leaf, builds up the peduncle in three sections, and at the top makes the cocoon a little on one side.

Commentary. Wesmael originally described his species from a single individual, to him of doubtful sex, sent to him by M. Robert, who had collected it in the outskirts of Liége. In the Wesmael Collection in Brussels is a single female standing under this name. This is obviously the original specimen, and it agrees perfectly and in the minutest detail with the long series from Germany referred to above and with which I myself compared it. The sex of Wesmael's single individual is clearly female, though I can appreciate the doubt in Wesmael's mind when he wrote :—" Le sexe de l'individu que je viens de décrire me semble douteux. Il n'y a pas de tarière saillante, et cependant les antennes sont filiformes, et composées vers l'extrémité d'articles assez allongés, comme on les voit ordinairement chez les femelles."

Bignell originally proposed the name *marshallii* for a single female bred by him on 20 June 1881, from " a half-grown larva of *Taeniocampa stabilis* " : and in 1906 he amplified this statement by giving the information that the cocoon from which this specimen had been bred was white and " of the usual appearance." In the Bignell Collection is a card with a single, damaged *Apanteles*, a single, damaged Lepidopterous larva, and a white parasitic cocoon not pedunculated. This card bears the serial number 87, against which number in his register Bignell gives the following data :—" 20 June 1881. Apanteles Marshalli M.S. Bred from stabilis. larva not ½ grown." This specimen is clearly the type of *marshallii*, therefore.

This specimen of Bignell's was described by Marshall as the female of *formosus*, but with some doubt on account of the host and the white, non-pedunculated cocoon, Bignell having bred a male from another host and with a pedunculated cocoon. Bignell refers to this doubt when proposing the name *marshallii*. Further, there is a large label attached to the card ser. no. 87 which bears these words :—" Described by T. A. Marshall as ♀ of formosus. The ♀ of formosus had not been bred at that time—therefore this must be renamed. I have therefore named it marshalli." It should also be recorded, since it is also of interest, that this specimen had previously been determined and recorded in Bignell's register as *formosus*, but that this name is erased both in pencil and in ink, and that the words " marshallii MS " are clearly an interpolation.

The doubt in Marshall's mind that led Bignell to propose the new name for his specimen was due both to the host record and to the white, ordinary cocoon. Messrs. Edelsten and Tams, however, are convinced that the caterpillar has been correctly determined as *Orthosia* (*Taeniocampa*) *stabilis* : the larva is very young, however, and badly damaged. The *Apanteles* is also badly damaged, having

lost its abdomen, which makes determination difficult: but there remains of the 1st tergite a sufficiency to show that it was flavo-testaceous, while the rest of the creature agrees perfectly with all the other material before me of *formosus*. I can only suggest therefore that some mistake has been made, and that the parasite and host have been incorrectly associated, or that in some cases, or when from some hosts, *formosus* does not make its pedunculated cocoon: but of these two suggestions the former seems to me the more likely.

Apanteles pinicola Lyle.

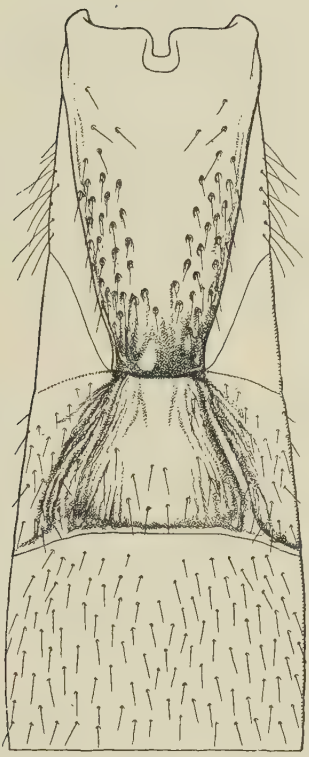
Apanteles pinicola Lyle, 1917, *Entomologist* **50**: 199–200. Butterfield & Lyle, 1929, *The Naturalist* **1929**: 306.

♀♂. Black; the four anterior coxae (save for occasional darkening basally, especially on middle coxae and especially in the ♂), and the four anterior legs wholly (save for darkened tarsi and black feet), hind trochanters in ♀ almost invariably, hind trochantines, hind femora (save at apex), hind tibiae (save for apical third to fifth), basal segment of hind tarsus at base, lateral membranous portions of the basal tergites, tegulae, palpi, and tibial spurs, red testaceous; wings infumated evenly throughout, and the setae coloured; hind trochanters in ♂ more usually darkened or black; stigma, metacarp, and wing-veins, brown, save that veins at extreme base of wing are red testaceous; stigma uniformly opaque.

♀♂. *Head*: face closely, indefinitely punctate (degree 3), commonly, with an unusually well-marked median longitudinal carina in upper third; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex exceedingly minutely punctate (degree 1); posterior ocelli equidistant from each other and the eyes; flagellum of ♀ about equal to combined length of head, thorax, and abdomen, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head, or longer than three times the length of the thorax. *Thorax*: mesonotum throughout regularly punctate (degree 2); disc of scutellum punctate throughout, closely so along sides; propodeon in basal half minutely punctate on each side of a smooth, flattened or slightly impressed, median area, in apical half with aciculation of variable strength radiating to a variable extent from the median apical lunule, the apical angles deeply impressed and with some weak rugosity. *Legs*: hind coxae basally above in a large area closely minutely punctate (degree 2) or punctate-aciculate, apically above and on outer faces throughout minutely punctate (degree 2 or 1), at apex above longitudinally striate; the longer hind tibial spur two-thirds, and the shorter spur about four-sevenths, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 70, 71 and 72): 1st tergite basally excavate, apically turned over, in basal third entirely smooth, down lateral fourths or even thirds strongly punctate (degree 4) and often longitudinally aciculate also, the apical fourth longitudinally striate and more usually with some strong punctures, the tergite medially otherwise entirely smooth and highly shining (save occasionally for indefinite aciculation), and the apical lunule occupying the entire apex; 2nd tergite more or less throughout with more or less indefinite longitudinal aciculation, in apical half with some minute punctation, the sulci much in evidence but not clearly delimitated; 3rd tergite smooth narrowly across base and in a small median basal area, otherwise minutely punctate; succeeding tergites minutely punctate; ventrites without median longitudinal suture; ovipositor sheaths considerably shorter than the basal segment, rather shorter than combined length of the 2nd and 3rd segments, and the ovipositor shorter than the basal segment, of the hind tarsus; hypopygium at apex cut away to form a short lower-posterior margin.

Length, 3·25–3·75 mm.

Redescribed from the following material:—British Museum: Lyle Collection, New Forest, 1 ♂, no. 216, 2.x.1908, 1 ♀, no. 261, x.1908, 1 ♀, no.



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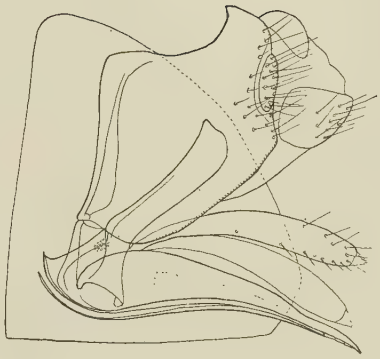

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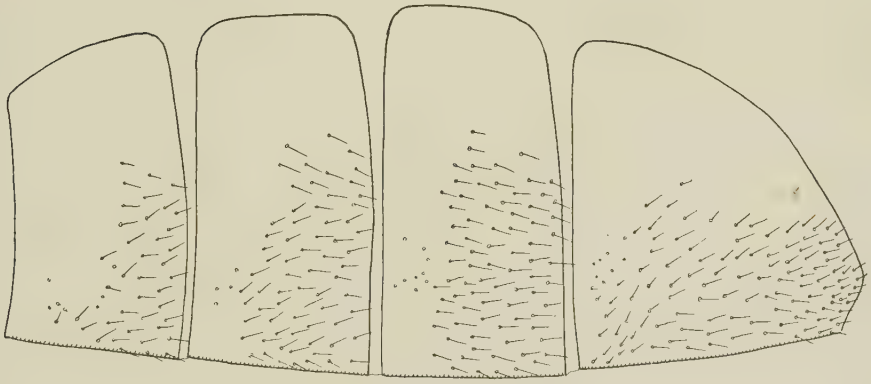

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FIG. 70.—*Apanteles pinicola* Lyle; basal tergites, ♀.

FIGS. 71 & 72.—*Apanteles pinicola* Lyle: 71, genitalia, ♀; 72, apical ventrites, ♀.

532, 2.vi.1910, 1 ♀, no. 1581, 16.x.1911, 3 ♂♂, nos. 2093–2095, ix.1912, 1 ♀, no. 2118, 27.xi.1912, 1 ♂, no. 2126A, x.1912, 2 ♂♂, nos. 2405, 2406, 18, 19.xi.1913, 5 ♂♂, nos. 2414, 2415, 2418, 2421, 2422, 22.ix.1913, 1 ♂, no. 2417, 23.ix.1913, 1 ♀, no. 2419, 22.ix.1913, 1 ♀ (*type*), no. 2420, 22.ix.1913, 3 ♀♀, nos. 2425–2427, 28.ix.1913, 1 ♀, no. 2430, 6.x.1913, 1 ♂, no. 2540, 20.v.1914, Chandler's Ford, 1 ♂, no. 2524, 4.v.1914, 1 ♂, no. 2529, 15.v.1914, and 1 ♂, no. 2535, 18.v.1914 (*G. T. Lyle*), New Forest, 1 ♀, no. 2640, 1.xii.1914; and, Everingham, Yorkshire, 1 ♂, no. 4792, 1923 (1924 in register) (*C. D. Ash*), det. Lyle as *pinicola* Lyle. D. S. Wilkinson's Collection: Crowborough, Sussex, 5 ♂♂, coll. 19.iv.1938, em. 26.v.1938, Parkhurst, I.o.W., 2 ♀♀, coll. 19.iv.1938, em. 26.v.1938, Oxshott, Surrey, 1 ♂, coll. 12.v.1939, em. 28.v.1939, Chilworth, Surrey, 4 ♀♀, 2 ♂♂, pup. 10.x.1938, em. 27.x.1938 (*R. L. E. Ford*); Chilworth, Surrey, 2 ♀♀, 1 ♂, pup. coll. 29.ix.1938, em. 4.x.1938 (*D. S. Wilkinson & R. L. E. Ford*); New Forest, 2 ♀♀, 1 ♂, coll. 6.ix.1938, em. 21, 25.ix.1938 (*S. Wakely*).

Type in the British Museum.

Host. Lyle originally described his *pinicola* as a common, solitary parasite of the Geometrids *Thera variata* Schiff. and *obeliscata* Hübn.; and all the material from which I have redescribed the species is recorded to have been bred from the former of these two, with the exception of Lyle's single male numbered 2535, which is recorded from *obeliscata*, the single male from Everingham, which is recorded from *Thera firmata* Hübn., and the Lyle specimens numbered 216, 261, 2118, and 2640, which are without certain host record or were swept.

I am informed, however, that all the above host records of *Thera variata* are almost certainly incorrect, and that the species was in reality *T. obeliscata*.

No further hosts have been recorded for this species in literature.

Cocoons white or very pale buff, solitary, attached to a pine-needle.

Commentary. Lyle originally described his *pinicola* from twenty-three females and eleven males, and as a solitary parasite of *Thera variata* and *T. obeliscata* in the New Forest and at Chandler's Ford. Under the name *pinicola* in the Lyle Collection were eleven females and seventeen males. Each of these specimens is on a separate card, and each card is numbered, in the usual manner of the Lyle Collection, and bears in addition a small, round, red or green label, the red labels having written on them " type ", and the green labels, " cotype "; while in Lyle's register against these numbers the *Apanteles* are determined as *pinicola* and are recorded as having been bred from *T. variata*, *T. obeliscata*, or swept. These specimens are quite obviously to be accepted as the original material, therefore; and they agree perfectly and in the minutest detail with all the other material before me from which I have redescribed the species.

I think the discrepancies between the number of specimens, of both sexes, labelled as type and cotype, and the number from which the species was originally described, are not a matter of great concern; and it only remains, therefore, to select a type, since in the Lyle Collection there are six specimens marked as type, four females and two males. It will be agreed that, if possible, one of these six should be chosen. The only four females, which need be considered, are numbered 532, 1581, 2420, and 2430, and were all bred from *variata* at a date earlier than 1917. The earliest one is so mounted that its hypopygium is not clearly visible, and the next, no. 1581, is mounted on its back; I am selecting the third, no. 2420, and so labelling it.

In addition to the Lyle material I have here discussed, there was one other Lyle male, as may be seen from the list of material before me; but this specimen is dated 1924, is not labelled cotype, and does not here concern us.

Apanteles lateralis Hal.

Microgaster lateralis Haliday, 1834, *Ent. Mag.* **2** : 248. *Apanteles lateralis* Haliday, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 221–222 (*excl. syn.*); *Spécies Hymen. d'Eur.* **4** : 487–488 (**in part.**) Bridgman, 1884, *Entomologist* **17** : 71. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 676 (**in part**). Lyle, 1917, *Entomologist* **50** : 198.

♀. Black; the four anterior legs (including the coxae but excluding the feet), hind coxae narrowly at extreme apex below, hind trochanters and trochantines, hind femora (save at apex, and rather extensively above at apex), hind tibiae in basal half or three-fifths, hind tarsi at extreme base, basal ventrites, palpi, and tegulae, red testaceous; tibial spurs pale;

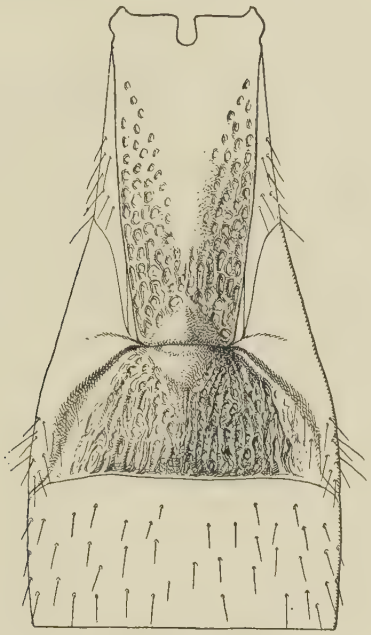

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Fig. 73.—*Apanteles lateralis* Haliday; basal tergites, ♀.

wings infumated evenly throughout, and the setae coloured save apparently in at least the basal half of hind-wing; stigma, metacarp, costal veins apically, and majority of remaining veins, brown, costal veins basally and other veins at base of wing red testaceous; stigma uniformly opaque.

♂. Agrees with description of colour of ♀ except in the hind legs; hind coxae black throughout, hind trochanters largely black, and hind femora black in at least apical third and extensively above.

♀♂. *Head*: face minutely punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli rather nearer to each other than to the eyes; flagellum of ♀ longer than combined length of thorax and abdomen, but shorter than combined length of head, thorax, and abdomen, of ♂ longer than three times the length of the thorax, and longer than combined length of thorax and abdomen together with three times the length of the head. *Thorax*: mesonotum closely, minutely punctate throughout; disc of scutellum throughout with well-separated punctures

(degree 3 or perhaps 4) which, although shallow, are quite clearly stronger than the punctures on at least the posterior half of the mesonotum; propodeon basally punctate (degrees 3 and 4) and often aciculate, the punctures well marked and well separated, apically with rugosity which radiates from the median apical lunule, and which extends obliquely almost to the spiracles, and which often occupies the whole of the apical angles, but as often the extreme apical angles entirely smooth. *Legs*: hind coxae apically above longitudinally striate,

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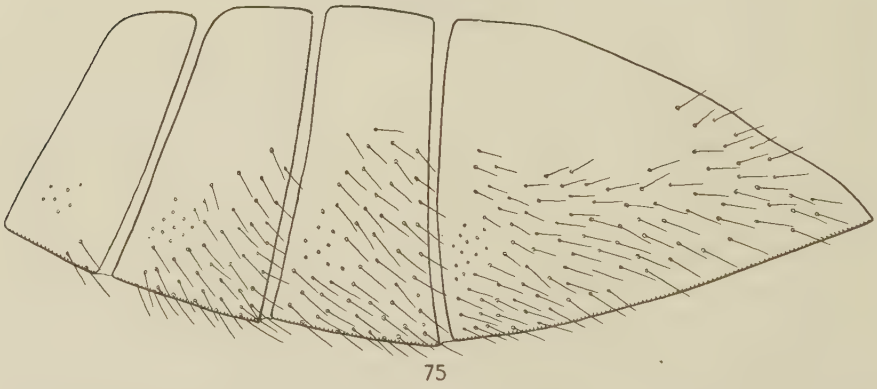


75

FIGS. 74 & 75.—*Apanteles lateralis* Haliday: 74, genitalia, ♀; 75, apical ventrites, ♀.

basally above closely and strongly punctate (degree 3 or 4), on outer faces also punctate but not quite so closely nor so strongly, all these punctures drawn out and so giving the appearance of weak rugosity; the longer hind tibial spur rather less than two-thirds, and the shorter spur half, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 73, 74 and 75): 1st tergite basally excavate and smooth, medially with an elongate smooth tumescence down the middle and punctate and aciculate on the margins, apically slightly turned over and punctate and aciculate or minutely rugose, the smooth apical lunule occupying almost the whole of the apex, the lateral margins of the tergite unusually straight

and contracting to apex; 2nd tergite throughout aciculate and with some few indefinite punctures, basally notably tumescent, its sulci, which are rarely (if ever) quite straight, more usually deeply impressed but often not clearly delimited; 3rd tergite in ♀ entirely smooth across base and apex, or even broadly across base, otherwise with widely separated minute punctation, in ♂ entirely smooth across apex and in the medial base, or even narrowly in the medial base, and broadly in lateral basal triangles, otherwise minutely punctate, the punctures more closely placed than in ♀; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; hypopygium acute, but not membranously so; ovipositor sheaths longer than the basal segment, somewhat shorter than the combined length of the two basal segments, of the hind tarsus, the ovipositor longer than hind tibia, somewhat shorter than hind tarsus.

Length, 2·5–3·0 mm.

Described from the following material:—British Museum: Haliday Collection, 1 ♀, 2 ♂♂, no. 19; Marshall Collection, 1 ♂, Govilon, det. *lateralis* Hal., 2 ♂♂, "N", 2 ♂♂, "N", 2.ix.1884, 2 ♂♂, "Bugbr.", 1 ♂, "Bfmg."; Lyle Collection, New Milton, 1 ♂, 20.vi.1914, ser. no. 2554, New Forest, 1 ♂, 19.vi.1915, ser. no. 2758, 4 ♀♀, 22.ix.1915, ser. nos. 2800–2803, 1 ♂, 28.v.1916, ser. no. 2892, 2 ♂♂, 3.vi.1916, ser. nos. 2901, 2902, 1 ♂, 7.vi.1916, ser. no. 2907 (*G. T. Lyle*), all det. Lyle as *lateralis*. Plymouth Museum: Bignell Collection: 1 ♂, reg. no. 1389, in register dated 16.vi.1883, 1 ♂ (now *neotype*), reg. no. 2076, in register dated 10.ix.1884, 1 ♀, reg. no. 2127, in register dated 16.ix.1884, 1 ♂, reg. no. 4201, in register dated 23.ix.1904, 1 ♂, 30.ix.1904, all det. *lateralis*, and 1 ♂. Norwich Castle Museum: Bridgman Collection: 1 ♀, no. 98, det. *lateralis*. Harwood Collection: 1 ♂, 20.ix.1883 (*W.H.B.F.*), det. *lateralis*. A. W. Stelfox's Collection: Ireland, Tullaghan, 1 ♀, 2 ♂♂, 24.vi.1936, 25.vi.1936 (*A.W.S.*), det. Stelfox as ? *lateralis*. D. S. Wilkinson's Collection: England, Surrey, Redhill, 2 ♂♂, coll. 22.vii.1937, em. 10.viii.1937, RF54, Kent, Bexley, 1 ♀, coll. 15.viii.1937, em. 30.viii.1937, RF60, 3 ♀♀, 1 ♂, coll. 10.viii.1938, em. 15.ix.1938, 28.ix.1938, RF138 (*R. L. E. Ford*), East Sussex, Staplecross, 13 ♀♀, 121 ♂♂, 15–19.ix.1938, RF139 (*D. S. Wilkinson & R. L. E. Ford*).

Further material examined:—

Type lost; *neotype* in the Plymouth Museum, Bignell Collection, reg. no. 2076.

Host. The original description of *lateralis* is without host record. Bignell's male that I have selected as the neotype is recorded by Marshall and by Bignell to have been bred from the Tineid *Simaethis oxyacanthella* L., now known as *S. fabriciana* L.; and from this host are recorded the male in the Bignell Collection dated 30 Sept. 1904, and his male with register number 4201, all the Lyle material, and Ford's seven specimens bred from material from Redhill and Bexley. The Harwood male is labelled to have been bred from this host with a query, and the long series from Staplecross was swept by Ford and myself from a large area of nettle where *S. fabriciana* was abundant and at that time of year when we had proved to our satisfaction, by breeding experiments, that the adult *Apanteles* should be flying.

There are in the literature various other records of hosts for this species of *Apanteles*, as follows; but, although I have not always seen the material upon which these records were based, I do accept them. Marshall (1885) states that Dorville bred the species from the Geometrid *Eupithecia assimilata* Guen., by which is meant *E. assimilata* Dbld., since there is no *E. assimilata* Guen.; and in 1874 he recorded it from *E. assimilaria* Dbld., by which also is meant *E.*

assimilata Dbld. Both Parfitt (1881) and Bignell (1901) refer to this record. Marshall also records a variety of the female to have been bred by Fletcher from the Tineid *Elachista taeniatella* Stn., and also follows Reinhard, who gave the Tineid *Hyponomeuta padella* L. as a host of this species if Ratzeburg's *Apanteles rufilabris* was correctly synonymised here, which we now know it was not. Finally, various authors, namely Conté (1912), Paddock (1913, 1914, 1933), Ruhl (1914), Picard (1926), Krebs (1932), and Suire (1933), have referred to *lateralis*, often with some doubt, as a parasite of the Pyralids *Galleria mellonella* L. and/or *Achroia grisella* F.

Cocoons pure white, solitary.

Commentary. Haliday originally described his *lateralis* from an unstated number of females and males, from his own collection, since he mentioned no other in the description of the typical specimens, as was his habit when describing some material from some collection other than his own, and from material that had not been bred, since he gave neither host nor habitat. He also described a variety of the species from an unstated number of males, from the collection of the Entomological Society, with habitat " in gramine nemorum frequens." In the remains of the Haliday Collection in the Dublin Museum is a single male labelled, in the minute handwriting usual for this collection, " *lateralis* " and " 140 ". This specimen agrees perfectly and in the minutest detail with, and is quite obviously referable to, *pinicola* Lyle, the original material of which is in the British Museum. But Lyle's species is not describable as " aculeo dimidii abdominis longitudine," the ovipositor and sheaths being far too short; and consequently I am unable to accept this male in Dublin as the type of *lateralis*. The type is lost, therefore, since in addition there is no material labelled with this name in the remains of the Entomological Society's collection in the British Museum.

The first reviser of *lateralis* Hal. is Reinhard 1881. This author redescribed from an unstated number of both females and males what he understood to be *lateralis*, and in the Reinhard Collection under this name are two females and a male. This material of Reinhard's and his description agree perfectly, but not with Haliday, and consequently I am unable to accept Reinhard. In his description Reinhard says: " Abdominis segmentum primum . . . apicem versus attenuatum, laeve, nitidum," and, as I have said, his material agrees; whereas Haliday, in the original description of his species, says: " Segmenti 1$^{mi.}$ scutum gracillimum elevatum, postice sensim attenuatum, punctulatum."

The second reviser of *lateralis* Hal. is Marshall 1885. This author redescribed from an unstated number of both females and males what he understood to be *lateralis*, mentioning two hosts. His words are:—". . . Bred by Dorville from *Eupithecia assimilata* Guenée; a ♀, Sept. 15th, by Bignell from *Symaethis oxyacanthella* L. . . .". He stated also that the species was abundant in a wood close to his house, at Nunton, and was taken at Maldon by Fitch. As I have stated previously, there are in the Marshall Collection eight males, one of them being labelled *lateralis*, and in the Bignell Collection, one female and five males, all determined as *lateralis* and in some cases recorded to have been bred from " *Symaethis oxyacanthella*." This material agrees perfectly with Marshall's description, and also, which is as important, with Haliday's original description, and is quite obviously to be accepted as the material from which a neotype must be selected. The selection of the neotype is not difficult. Of the Bignell material, two males are without data and two other males, although recorded from *oxyacanthella*, are dated 1904, and are thus all easily rejected; and the

female only was captured. There is no specimen dated 15 Sept., as stated by Marshall, remaining in the Bignell Collection, but the entry in Bignell's register against this date says : " 2108. *Apanteles lateralis* Hal. ♀. Bred from *Symaethis oxyacanthella*. Same as 2076." The remaining male of the five is this specimen, no. 2076, and the entry in Bignell's register against this number is " Sept. 10th, 1884. *Apanteles lateralis* Hal. ♂. Bred from *Simaethis oxyacanthella*—and 2108." There is no question, therefore, but that I should select this male as the neotype; and this I am doing, and so labelling it. It is obviously preferable to select this male rather than one of the eight without data in the Marshall Collection; and Dorville's material, although mentioned by Marshall first, and therefore really of priority, is unknown to me.

Apanteles inclusus Ratz.

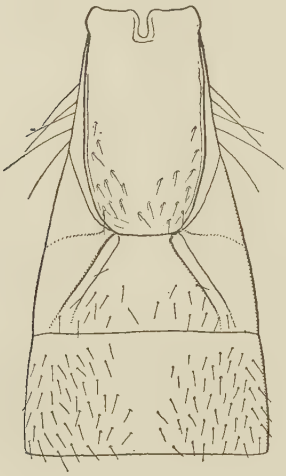
Microgaster inclusus Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 70; 1848, **2** : 51; 1852, **3** : 52.
Apanteles inclusus Ratzeburg, Reinhard, 1881, *Deuts. ent. Z.* **25** : 36. Lyle, 1925, *Ent. mon. Mag.* **61** : 121.

♀. Black; the fore legs (except the coxae), middle legs (except for the coxae and trochanters, and for some slight darkening on the trochantines, and also on the basal third or half of the femora above and below), basal fourth or third of the hind tibiae, basal ventrites, red testaceous; the hind legs otherwise, save for the black coxae and very definitely darkened trochanters, red testaceous to red-brown in varying degrees of strength, and in the hind femora in varying degrees of both strength and extent; palpi and tibial spurs pale; costal veins testaceous, darkening at extreme apex on approaching the stigma; stigma and metacarp dark brown; remaining veins with but slight coloration; stigma uniformly opaque.

♂. Black; the fore legs (except for the coxae and for a small touch of darkening on the femora at the extreme base below), middle legs (save for the coxae, trochanters, sometimes also the trochantines, and in darker specimens for quite the basal half of the femora, and always at least as much as in the female darkened), basal fourth of the hind tibiae, basal ventrites, red testaceous; hind coxae and trochanters black; hind legs otherwise red testaceous to red-brown in varying degrees of strength, in the hind femora of both strength and extent, so that sometimes the hind femora and apical portion of hind tibiae would be more rightly describable as strongly darkened; stigma and metacarp dark brown, remaining veins with but slight coloration, often colourless; stigma uniformly opaque; wings pure hyaline, iridescent, with their setae white.

♀♂. *Head* not highly shining; face and clypeus with regularly placed, minute punctation throughout (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frons and vertex more sparsely and more weakly punctate than the face; posterior ocelli nearer to each other than to the eyes; flagellum of female about as long as, of male longer than, combined length of head, thorax, and abdomen. *Thorax* : mesonotum and disc of scutellum regularly, minutely punctate throughout (degree 2), perhaps rather more sparsely and weakly on the scutellum, not highly shining, in certain lights decidedly pruinose; the scutellar sulcus well marked, straight, without or with but exceedingly faintly indicated crenulation; the non-excavate area of the lateral faces of the scutellum perhaps just reaching up halfway to base of scutellum, definitely not reaching up beyond half-way; propodeon highly shining, smooth, its basal half throughout with minute (degree 1), rather sparse punctation, and its apical half devoid of sculpture. Upper portion of basal vein noticeably long; 1st abscissa of radial and transverse cubital without angulation, evenly curved throughout. *Legs* : hind coxae above and in the upper half of the outer faces more or less entirely smooth save for some strong punctures (degree 4) widely scattered throughout the basal half above, and save for a group of weaker punctures (degree 2 or 3) occupying the majority of

the apical half above; hind coxae in the lower half of the outer faces with close minute punctation; the longer hind tibial spur five-ninths, and the shorter spur two-fifths, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 76, 77 and 78): 1st tergite shining, excavate slightly in the basal half, turned over slightly in the apical third where there is certain minute punctation, especially in the lateral thirds; 2nd tergite shining, entirely smooth save for some minute (degree 1), widely spaced punctation, and for of course its sulci, which are smooth, more or less straight, and which often appear not to reach quite to the apex of the tergite; 3rd and succeeding tergites with minute (degree 2) puncta-



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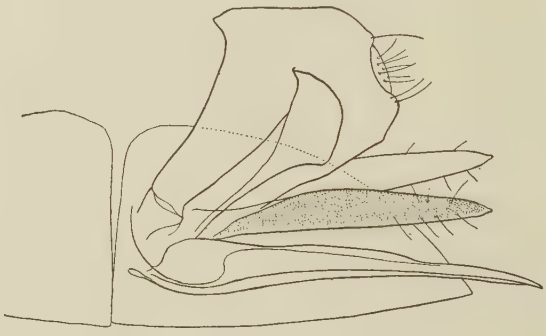

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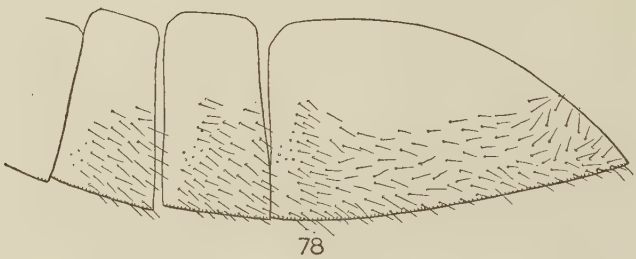

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Fig. 76.—*Apanteles inclusus* Ratzeburg; basal tergites, ♀.

Figs. 77 & 78.—*Apanteles inclusus* Ratzeburg: 77, genitalia, ♀; 78, apical ventrites, ♀.

tion more or less regularly throughout, save for a small area medianly at base, and for a smooth, narrow, median, longitudinal line; ovipositor sheaths shorter than the hind femora; hypopygium prominently acute, chitinous, not membranous.

Length: ♀, 2·75 mm.; ♂, 2·5 mm.

Redescribed from the following material:—Ratzeburg Collection: 2 ♀♀, with an unreadable label, 2 ♂♂, unlabelled. Reinhard Collection: 1 ♀, labelled " typ " and " Ratzb. Liparis auriflua ", and with a modern red type label. British Museum: Lyle Collection; a card of sixteen (7 ♀♀, 7 ♂♂, 2 ?), ser. no. 3016, Abbot's Wood, 1916 (*C. W. Colthrup*), determined by Lyle as *inclusus*. Zoologisches Museum der Universität, Berlin: Leipzig, 11 ♀♀, 13 ♂♂, 22.v.1890 (*Dr. R. Krieger*).

Type in the Zoologisches Museum der Universität, Berlin.

Host. Ratzeburg originally described his species as a gregarious parasite

on the Lymantriid " *Liparis auriflua* " : this name is now to be associated with either the name *Euproctis chrysorrhoea* L., which is the more probable, or possibly with *E. phaeorrhoea* Haworth. The Lyle material from Abbot's Wood, as also the Krieger material from Leipzig, is recorded from *Porthesia similis* Fuessl., which is the same species as " *Liparis auriflua.*"

Wolff & Krausse in their textbook (1922) also recorded another Lymantriid as a host of this *Apanteles*, namely *Lymantria monacha* L.; but I have not seen any of the material on which this record is based.

Cocoons. The larvae of *inclusus* pupate inside the puparium of their host, and the cocoons are white. The Lyle series referred to above is stated to be part of a batch of thirty-five specimens; Ratzeburg appears to have bred only from ten to fifteen from one host larva.

Commentary. Ratzeburg originally described this species, from the female only, from an unstated number of individuals bred as parasites of " *Liparis auriflua.*" In the Ratzeburg Collection under this name were four specimens of an *Apanteles* : these are before me as I write. They are mounted on two pins, two to a pin. In addition, one of the pins has a young host-larva, and the other a puparium of the host with parasitic cocoons inside it. Despite the fact, however, that these were the only specimens in the Ratzeburg Collection under this name, and that they were standing under a label in Ratzeburg's own handwriting, and in a position in the collection more or less exactly where one would expect to find them, none of them, I submit, can rightly be accepted as the type of the species since two of the four specimens are males. We must look elsewhere for the type : we have not far to look. Reinhard, in his revision, records that he received two females of *inclusus* from Ratzeburg himself : and in the Reinhard Collection in Berlin were, amongst others, two females standing under the name *inclusus* Ratz., labelled " typ " and " Ratzb. Liparis auriflua ". These are unquestionably the two females referred to by Reinhard, and, in view of my statements above in the matter of the sexes, are in my opinion much more likely to be, in fact are almost certainly, a portion of, if not all, the material from which Ratzeburg drew up his original description. One of these two specimens is before me as I write. This one I intend to accept as the type : I have so labelled it.

In addition, it should be remarked that the four specimens from the Ratzeburg Collection, and the two referred to above from the Reinhard Collection, are clearly conspecific, that they agree perfectly and in the minutest detail with both the Lyle and the Krieger series, and that all agree excellently with Ratzeburg's original description; while not only the host larva from the Ratzeburg Collection but also that with the Krieger series is, in the opinion of Messrs. Tams and Collenette, undoubtedly either a specimen of *Euproctis chrysorrhoea* L., or *E. phaeorrhoeus* Haworth, to one of which latter *Liparis auriflua* is referable. Finally, the host puparium, with the parasitised cocoons inside it, is exactly as described by Ratzeburg.

A. inclusus was not known to Marshall : there is no material in his collection, and in his key he placed the species in his Section 3, where of course it does not belong.

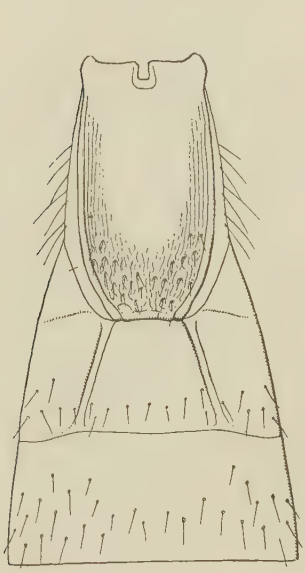
Apanteles octonarius Ratz.

Microgaster octonarius Ratzeburg, 1852, *Ichn. d. Forstins.* **3** : 52.
Apanteles octonarius Ratzeburg, Reinhard, 1881, *Deuts. ent. Z.* **25** : 35.
Apanteles lucifugus Lyle, 1917, *Entomologist* **50** : 197 (**syn. n.**).

♀. Black; legs (save for all coxae which are black, and for the hind tarsi and apical third of the hind tibiae which are slightly darkened), tegulae, and sternites and pleurites of

at least the basal half of the abdomen, red testaceous; antennae often more red than usual, with the scape often largely red testaceous; palpi and tibial spurs pale; costal veins at least testaceous basally; stigma, metacarp, and majority of the wing-veins light brown; stigma uniformly opaque; wings lightly (but distinctly) infumated evenly throughout.

♂. Black; legs (save for all coxae which are black, for the hind trochanters and trochantines which are slightly darkened, and for the hind tarsi and apical half or two-fifths of the hind tibiae which are strongly darkened), sternites and pleurites of at least the basal half of the abdomen, red testaceous; tegulae testaceous to darkened, at least not red testaceous; scape of antennae often in part red testaceous; palpi and tibial spurs pale; costal veins, stigma, metacarp, and majority of the wing-veins light brown; stigma uniformly opaque; wings lightly (but distinctly) infumated evenly throughout.



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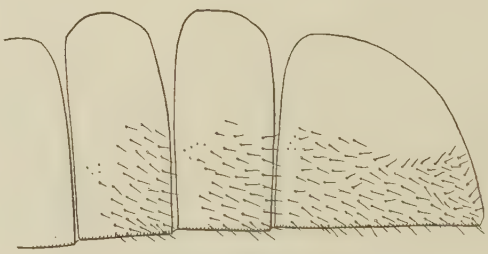


81

Fig. 79.—*Apanteles octonarius* Ratzeburg; basal tergites, ♀.
Figs. 80 & 81.—*Apanteles octonarius* Ratzeburg: 80, genitalia, ♀; 81, apical ventrites, ♀.

♀♂. *Head*: face and clypeus with regularly placed, minute punctation (degree 2) throughout; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex more sparsely and more weakly punctate than the face; posterior ocelli about equidistant from each other and from the eyes, or just nearer to each other; flagellum of female rather longer than, of male distinctly longer than, combined length of head, thorax, and abdomen. *Thorax*: mesonotum and disc of scutellum regularly, minutely punctate (degree 1) throughout, perhaps even more sparsely and weakly on the disc of the scutellum, not highly shining, in certain lights decidedly pruinose; the scutellar sulcus well marked, straight or nearly so, at least with some crenulation; the non-excavate area of the lateral faces of the scutellum small; propodeon highly shining, in the apical half with a variable amount of more or less irregular aciculation, in the basal half entirely smooth save for a group of minute punctures on each side of a smooth median area. First abscissa of radial and transverse cubital virtually without angulation. *Legs*: hind coxae in upper half of outer faces, and above, entirely smooth and highly polished save for some minute punctures apically and for some

strong punctures (degree 4) scattered widely in the basal half above; the longer hind tibial spur two-thirds, and the shorter spur two-fifths, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 79, 80 and 81): 1st tergite slightly excavate in the basal half, slightly turned over in the apical half, in about the lateral fourths almost throughout its length and in at least its apical third entirely distinctly aciculated and dull; 2nd tergite shining, entirely smooth save for two or three minute punctures across its apex and for of course its sulci, which are straight, more or less smooth, and which unquestionably reach the apex of the tergite; 2nd suture well marked; 3rd and succeeding tergites with one or two rows of sparsely placed, minute punctures across the apical half, otherwise entirely smooth; ovipositor sheaths shorter than the hind femora; hypopygium truncate or even with the posterior margin slightly cut away below to form a short lower-posterior margin.

Length, 2·0–2·75 mm.

Redescribed from the following material:—Ratzeburg Collection: 1 ♀, with a determination label in Ratzeburg's writing (selected by me as the *type*), 1 ♀, unlabelled, 1 ♀, 1 ♂, with a determination label in Ratzeburg's writing. Reinhard Collection: 1 ♀, unlabelled. British Museum: Lyle Collection; a card of twelve (4 ♀♀, 8 ♂♂), ser. no. 1353, New Forest, 20.vi.1911 (*G. T. Lyle*), the original series of, and described by Lyle as, *Apanteles lucifugus*. Zoologisches Museum der Universität, Berlin: Leipzig, 3 ♀♀, 2 ♂♂, 10.vii.1890, 6 ♀♀, 13.vii.1890, 16 ♀♀, 9 ♂♂, 16.vii.1890 (*Dr. R. Krieger*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Leipzig, 5 ♂♂, undated (*Dr. R. Krieger*).

Type in the Forstlichen Hochschule, Eberswalde. *Type* of *lucifugus* in the British Museum; Lyle's serial no. 1353.

Host. The species was originally recorded by Ratzeburg from the Arctiid, *Noctua*, now *Oenistis*, *quadra* L., a species that has also been referred to under the generic name of *Gnophria*. From this host also was bred the Krieger series of 16 July that I have referred to above.

Lyle recorded that the brood of thirteen he described as *lucifugus* was bred either from the Agrotid, *Laspeyria flexula* Schiff., or from the Arctiid, *Lithosia deplana* Esp., which latter is now known as *Eilema depressa* Esp., and added "probably the former." I consider it was probably the latter, if only because from this latter was bred the remainder of the Krieger material referred to above.

Cocoons pure white. Lyle, under of course *lucifugus*, describes them as almost smooth, and, in the only case he had observed, attached in an irregular cluster to the bark: but personally I should have said—a more or less regular cluster.

Commentary. Ratzeburg originally described *octonarius* from "eight females" that he had bred all together. In the Ratzeburg Collection under this name were four specimens of an *Apanteles*: and these are before me as I write. They are mounted on three pins:—on the first pin, a single female, with a determination label in Ratzeburg's own writing; on the second pin, a single female and a single white cocoon, but no label; and on the third pin, a male and a female, with a determination label as before. The single female on the first pin was in a different part of the drawer from the other three specimens, which latter were all together; and since this species was not in the first volume of Ratzeburg's work none of the specimens was standing under a label written in his copper-plate handwriting. Now, these four specimens, being clearly conspecific, agreeing perfectly with Ratzeburg's description, and bearing determination labels in Ratzeburg's own writing, are unquestionably *octonarius* Ratz.

In my opinion, further, they are part of the original series of eight, despite the one male : and consequently I have labelled as the *type* the single female that was standing apart from the other three.

It is of interest to note, in addition, that in the Reinhard Collection are a further four males and females correctly named as *octonarius* Ratz. One female of these latter I have before me now : it agrees perfectly with the four belonging to Eberswalde. I doubt, however, if these in the Reinhard Collection can be taken to be the four specimens missing from Eberswalde since they do not appear to be mounted in quite the same manner nor upon the same type of card, while Reinhard makes no mention of having received from Ratzeburg any specimens of this species.

Lyle originally described *lucifugus* from " nine males and three females out of a brood of thirteen." There is before me from his collection in the British Museum a cardful of twelve specimens labelled " type " and " Apanteles lucifugus ". This lot is unquestionably the original series, despite the fact that of the twelve specimens eight are males and four females.

The *octonarius* Ratz., of Marshall and of Lyle is a very different species. How Marshall could have made this gross mistake I cannot understand. For it is a gross mistake. Marshall, when discussing *octonarius*, says, " distinguished . . . by the rugulose metathorax " ; this can hardly be made to agree with Ratzeburg, who says " der Metathorax ist eher glatt als runzelig." Again, *octonarius* was quite definitely placed by Ratzeburg in his key in a group, the radial and transverse cubital veins of which were not angled with each other; these veins in the *octonarius* of Marshall are strongly angled, not even just slightly angled. Lyle quite obviously merely followed Marshall.

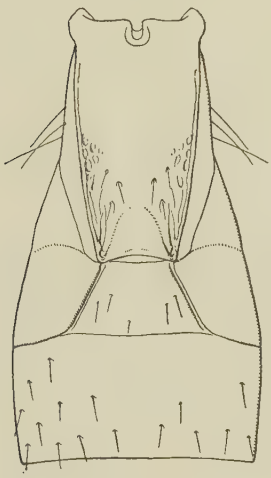
Apanteles thompsoni Lyle.

Apanteles thompsoni Lyle, 1927, *Bull. entom. Res.* **17**, no. 4 : 415. Thompson and Parker, 1928, *U.S. Dept. Agric. Tech. Bull.* no. **59** : 31–32. Jones, 1928, 58th *Ann. Rep. Ent. Soc. Ontario* **1927** : 55, 56; 1929, *U.S. Dept. Agric. Tech. Bull.* no. **98** : 1–27. Baird, 1929, 59th *Ann. Rep. Ent. Soc. Ontario* **1928** : 38–40. Parker, Vance, Smith, and Gamkrelidze, 1929, *J. econ. Ent.* **22**, no. 4 : 688–693. Vance, 1931, *U.S. Dept. Agric. Tech. Bull.* no. **233** : 1–28. Goidanich, 1931, *Boll. Lab. ent. Bologna* **4** : 141–142. Wilkinson, 1932, *Trans. ent. Soc. Lond.* **80** : 332.

♀. Black; mandibles, tegulae, the four anterior legs entirely (including the coxae but excluding the feet), the hind trochanters and trochantines, hind femora (save for a touch of darkening at extreme apex above), and the hind tibiae (save for some darkening in apical third), red testaceous; hind tarsi slightly darkened; antennae dark brown, the scape sometimes with some red testaceous areas; palpi, tibial spurs, and basal ventrites, pale; wings perhaps just faintly infumated evenly throughout, the setae coloured; wing-veins, stigma, and metacarp, light brown evenly throughout; stigma uniformly opaque.

♀. *Head* broader than mesonotum; face perhaps somewhat swollen; face and clypeus punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frons and vertex minutely punctate (degree 1); posterior ocelli nearer to each other than to the eyes; flagellum shorter than combined length of thorax and abdomen, but longer than combined length of thorax and head, rather longer than the combined length of thorax and the three basal tergites. *Thorax* to some extent compressed dorso-ventrally; mesonotum, disc of scutellum, and propodeon anteriorly, more or less on the same plane; mesonotum highly shining, punctate, anteriorly the punctures distinctly separated and fairly strong (degree 3), posteriorly widely separated and minute (degree 1); scutellar sulcus narrow, shallow, evenly rounded; disc of scutellum smooth and highly shining like the mesonotum, with some few minute (degree 1) punctures down each side; propodeon shining, smooth,

with some exceedingly minute (almost obsolete), widely placed punctures in the basal half and down the middle. *Legs*: hind coxae basally above with strong (degrees 4 and 3) and closely placed punctation, on outer faces throughout with minute (degree 1), widely separated punctation; hind tarsi longer than hind tibiae; the longer hind tibial spur seven-twelfths, and the shorter spur five-twelfths, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 82, 83 and 84); 1st tergite in about the basal half or five-eighths slightly excavated and almost entirely smooth and shining, in about the apical half or three-eighths



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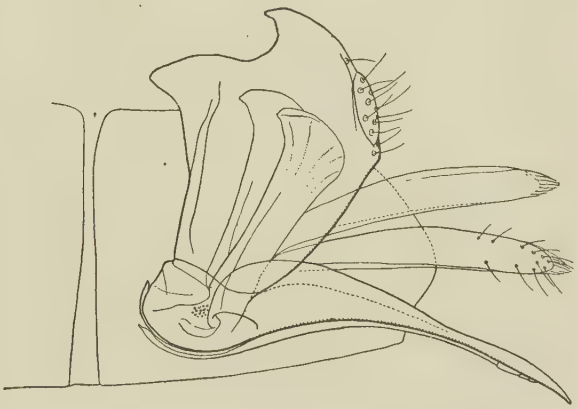

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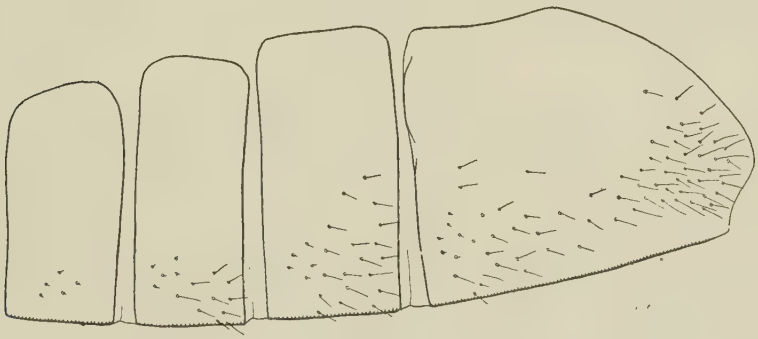

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FIG. 82.—*Apanteles thompsoni* Lyle; basal tergites, ♀.

FIGS. 83 & 84.—*Apanteles thompsoni* Lyle: 83, genitalia, ♀; 84, apical ventrites, ♀.

slightly turned over and smooth save for some weak sculpture down the extreme lateral margins and for some occasional aciculation across shortly before the apex; 2nd tergite distinctly shorter than 3rd, with diverging discal sulci (much as in Group A) alongside which is commonly some aciculation, otherwise smooth save for an occasional minute puncture; 2nd suture obsolete; 3rd and succeeding tergites smooth save for a few minute punctures; ventrites without median longitudinal suture; ovipositor sheaths longer than the basal joint of the hind tarsus but shorter than the combined length of the two basal joints; hypo-

pygium at apex below cut away, but the edge of this lower-posterior margin membranous and not strongly delimited.

Length, 2·0–2·5 mm.

Redescribed from the following material :—British Museum : France, Lille, 2 ♀♀, May 1925 (*Dr. W. R. Thompson*), 8 ♀♀, 1931, ser. no. 3930 (*H. D. Smith*), 4 ♀♀, undated, ser. nos. 742 and 742A (*H. L. Parker*). D. S. Wilkinson's Collection : France, Lille, 3 ♀♀, May 1925 (*Dr. W. R. Thompson*), 5 ♀♀, 1931, ser. no. 3930 (*H. D. Smith*), 2 ♀♀, undated, ser. nos. 742 and 742A (*H. L. Parker*). Imperial Institute of Entomology : France, Lille, 3 ♀♀, May 1925 (*Dr. W. R. Thompson*), 2 ♀♀, March 1923 [?], ser. no. 251, Webster no. 18818 (*Thompson*).

Type in the British Museum.

Host. This species was originally described by Lyle as a solitary parasite of the cane-borer, the Pyralid, *Pyrausta nubilalis* Hübn., and from this host was bred all the above material from which I have redescribed this parasite.

Vance (1931), in his exhaustive paper on *A. thompsoni*, a paper that unfortunately can neither here be quoted *in extenso* nor adequately summarised, but to which I am indebted for all my information on the biology of this *Apanteles*, except where otherwise stated, records that the most favoured habitat of this species, so far as is known, appears to be the lowlands of north-central France, and Flanders, where it attacks *P. nubilalis* infesting *Artemisia vulgaris* L., but that it has also been found, in limited quantities, in other districts where corn is the chief food of the borer, namely in the Jura area of eastern France, and in Bayonne, and also possibly in Russia : while Clark (1934) also records the species from Japan and Manchuria, and Ellinger (1930) definitely from Russia.

Jones (1929) records that one thrust of the ovipositor suffices for the deposition in the host larva of as many as 40 eggs, but Vance states that the number of eggs deposited at a single thrust of the ovipositor is variable, from 20 to 25 seemingly being the normal number. A third-stage borer larva was once exposed, under laboratory conditions, for 15 minutes to the attacks of many *Apanteles* females : it received 45 distinct thrusts of different ovipositors, and on later dissection was found to contain at least 868 eggs. The average capacity of the female ovaries, according to Vance, seems to be about 230 eggs. He states further that there seems to be no decided preference as between 2nd, 3rd, and 4th stage host larvae, and that the 1st and 5th stage larvae are not immune from attack, but that the former are too small and weak in themselves to withstand parasitism effectually and soon die either from the shock of the sting or from the presence of the parasite eggs, while the skin of the latter is too thick easily to permit the penetration of the ovipositor.

The parasite larva passes through three distinct and well-defined larval stages, moulting twice in the body of the host and a third time within the newly spun cocoon. The cast skins of the 1st and 2nd moults are pushed towards the posterior end of the larva, where they sometimes remain attached for a short time before being entirely shed. An *Apanteles* larva often starts spinning while issuing from the host, and the threads are first attached near the middle of its own body. Nearly 24 hours are required for the whole spinning process, and another 24 hours elapses before the casting of the meconium and the voiding of waste matter within the cocoon just prior to pupation. At Hyères the pupal period seems to vary between nine and fifteen days. According to Vance, the average colony of the *Apanteles* comprises from 15 to 20 individuals : Thompson and Parker (1928) record the average to be 15 individuals.

In this species the phenomenon of thelyotoky is exhibited, no males being known, the females being reproduced parthenogenetically generation after generation.

A. thompsoni, after overwintering as a partly grown 1st stage larva within the body of its host, continues its development in early spring, and issues to spin its cocoon from the middle of April to the end of the third week in May. Adults usually start emerging about 15 May, and by early June nearly all have left their cocoons. Thompson and Parker (1928) were of the opinion that *thompsoni* had two generations a year in the Lille region, from the fact that empty cocoons were found about the middle of August in green *Artemisia* plants : Vance, however, is convinced that there is only one full generation a year, and points out that several times in June and July, 1929, *Apanteles* cocoons from which the adults had emerged were collected from *Artemisia* of that year's growth, indicating that the overwintering host larvae sometimes migrate into fresh *Artemisia* stems in the spring before the time for the parasite larvae to issue.

Apanteles thompsoni has been imported into N. America against *P. nubilalis*. Jones (1929) records that the species has been recovered, after liberation, but that it is not known whether it is established. Baird (1929, 59*th Ann. Rep. ent. Soc. Ontario* **1928** : 38–40) records its introduction into Canada, but again cannot say whether it is established.

Cocoons pure white, to be found in a loosely connected mass within the tunnel made by the host larva in the plant.

Commentary. Lyle originally described this species from eleven females bred from *Pyrausta nubilalis* in May 1925, at Lille, in France, and forwarded to him, through the Imperial Institute of Entomology, by Dr. W. R. Thompson. The material from which I have redescribed this species, labelled Lille, May 1925, Dr. W. R. Thompson, is clearly and unquestionably the major part of the original series, therefore : in fact it was I who labelled up and distributed this material on its return to us from Lyle.

Apanteles falcatus Nees.

Microgaster falcatus Nees, 1834, *Hym. Ichn. aff. Mon.* **1** : 175. *Apanteles falcatus* Nees, Reinhard, 1881, *Deuts. ent. Z.* **25** : 37. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 192. Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 441–442. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 672. Watanabe, 1932, *Ins. Matsumura.* **7** : 92..
Microgaster equestris Haliday, 1834, *Ent. Mag.* **2** : 242.
Apanteles priapus Gautier & Cleu, 1927, *Ann. Soc. ent. France* **96** : 85–91 (**syn. n.**).

♀♂. Black; all trochantines, the femora and tibiae of the front and middle legs, the tegulae, and the lateral membranous margins of the basal tergites, red testaceous; all trochanters either entirely red testaceous or, which is quite common, much darkened in large areas, or even black; all tarsi darkened, sometimes quite strongly so; hind femora and tibiae red testaceous, the femora rarely and the tibiae commonly with the usual slight apical darkening; tibial spurs pale or red testaceous; palpi red testaceous or even darkened; the middle coxae almost invariably and often extensively, and the front coxae commonly, red testaceous at apex; wings infumated, and the setae coloured; stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown or even dark brown, the costal veins and all remaining veins, particularly towards base of wing, more or less red testaceous; stigma uniformly opaque.

♀♂. *Head* : face and clypeus punctate regularly throughout (degree 3); facial depressions nearer to apex of clypeus than to the eyes; frontal orbits, frons, and vertex, closely minutely punctate throughout (degree 2); posterior ocelli equidistant from each other and the eyes; flagellum of ♀ about equal to the combined length of thorax and

abdomen, of ♂ about equal to the combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum with regularly placed punctation throughout (degree 3); disc of scutellum throughout with scattered punctation (degree 3), which is very distinctly more widely spaced than that on the mesonotum; propodeon closely and strongly punctate (degree 4, or even sometimes 5), in the more strongly sculptured examples rugoso-punctate, the apical angles shining and entirely smooth save for some obscure carination; from the median apical lunule there sometimes radiate into about the apical third of the propodeon numerous short carinae, while in the apical half, sometimes even in the apical two-thirds, and almost (but not quite) invariably in at least the apical fourth, there is a closely compacted group of median longitudinal rugose carinae.

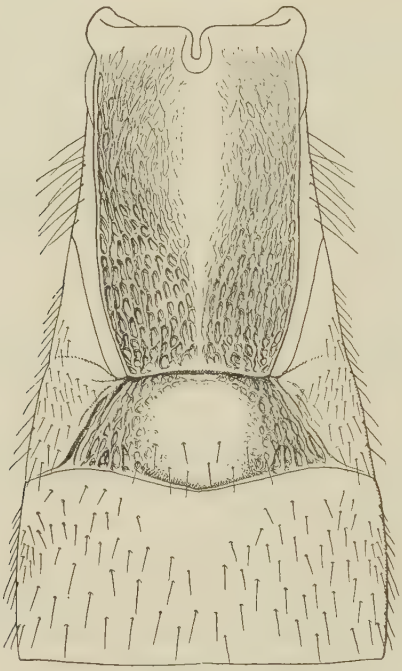

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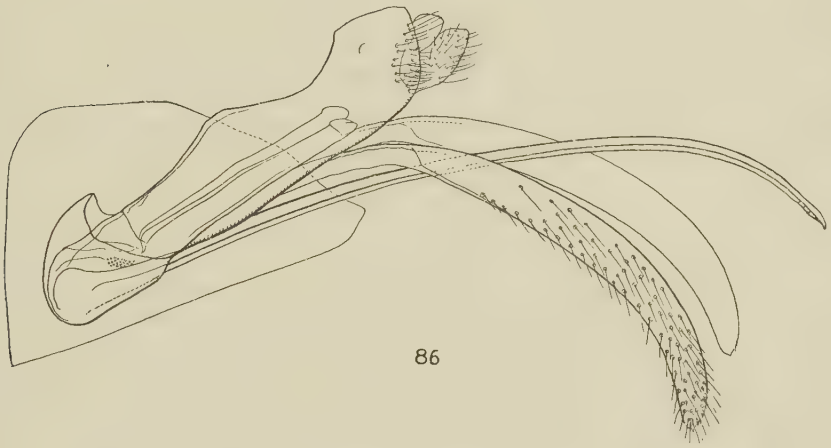
Fig. 85.—*Apanteles falcatus* Nees; basal tergites, ♀.

Legs: hind coxae on outer faces and above punctate (degree 3), apically above closely punctate, basally above very closely punctate or even minutely rugose; hind tibial spurs subequal, the shorter spur about half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 85, 86 and 87): 1st tergite weakly excavate in the basal half, weakly turned over in the apical half, and with a very weak median tumescence that may be either entirely smooth and shining or dull and finely sculptured, the tergite otherwise throughout longitudinally rugose, more or less finely so in the basal half, where often the median longitudinal third is shining and nearly or quite smooth, more strongly so in the apical half or two-fifths where in addition there are numerous, strong, rugose punctures; 2nd tergite with its discal sulci and its lateral fourths (of the disc) longitudinally rugose, medianly more or less smooth and shining save for some minute longitudinal aciculation across base and apex and for some exceedingly minute punctation in the apical half; 1st and 2nd tergites relatively rather longer in the ♂ than in the ♀; 2nd suture strongly bisinuate; 3rd tergite minutely

punctate throughout, in the ♀ entirely smooth narrowly across base (and perhaps across apex) and in a medial basal area, the punctures in the ♀ distinctly more widely spaced and fewer, and with the setae longer, than in the ♂, the tergite otherwise smooth and shining; succeeding tergites smooth and shining and minutely punctate throughout, distinctly more densely punctate and with shorter setae in the ♂ than in the ♀, there being on the 4th, 5th, and 6th tergites certainly four transverse rows of punctures in the ♂, and not always and



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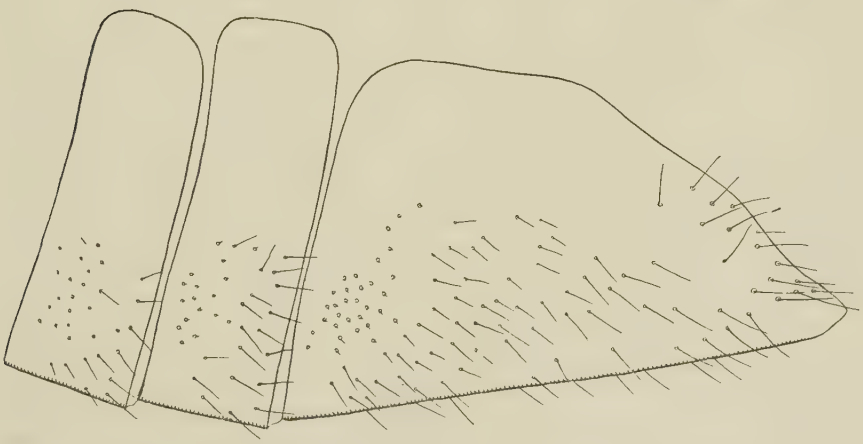


87

FIGS. 86 & 87.—*Apanteles falcatus* Nees: 86, genitalia, ♀; 87, apical ventrites, ♀.

never (or rarely) more than three in the ♀; ventrites of ♀ nos. 2, 3, and 4, with traces of an obsolete (or incipient) median longitudinal suture, the preapical ventrite and the hypopygium without median longitudinal suture; ovipositor sheaths falciform, very large, the pigmented portion as long as or rather longer than the hind tibia; ovipositor very long, rather longer than the combined length of a hind femur and a hind tibia; ♂ genitalia huge, more than a third the length of the abdomen, and prominently extruded; hypopygium very large, its apex cut away to form a short lower-apical margin.

Length, 3·0–4·0 mm.

Redescribed from the following material :—British Museum : Marshall, Collection, " Cwthy," 5 ♀♀; Lyle Collection, Whitby, 2 ♀♀, nos. 4588, 4592, Aug. 1923, 1 ♀, 1 ♂, nos. 5128, 5129, 28.viii.1927, det. Lyle as *falcatus*; Entomological Society Collection, 1 ♀ (*type* of *equestris*), ser. no. 20; Ruthe Collection, Germany, 11 ♀♀, 2 ♂♂; General Collection, Windsor Forest, Berks, 1 ♀, 9.viii.1930 (*H. St. J. Donisthorpe*), Hay, Hereford, 4 ♀♀, viii.1934 (*C. G. Lamb*), Saghalin, Adachi, Isshiki, 1 ♀, 28.vii.1914, det. Watanabe as *falcatus*; and 1 ♀, 1 ♂, labelled as cotypes of *priapus*. Bignell Collection : a card of six (5 ♀♀, 1 ♂), 24.vii.1882, reg. no. 789, a card of four (4 ♀♀), apparently of six or more originally, without register number but from data on back obviously same lot as the card of six; 1 ♀, reg. no. 2877, the register giving 2.viii.1885; and 1 ♀, Blackheath, all det. as *falcatus*. Bridgman Collection : two cards of two (each with 1 ♀, 1 ♂), 24.vii.1882, reg. no. 754, det. as *falcatus*. Fitch Collection : 1 ♀, no. 196 and A3484, 1 ♀, no. 197 and A3484; 1 ♀, 23/80; 1 ♀, Maldon 1882; 4 ♀♀, 1 ♂, " Bugbr," all det. as *falcatus*. Harwood Collection : 1 ♀, 1 ♂, without data; 2 ♀♀, labelled " Wimbledon ? Marshall Coll."; 1 ♀, Wimbledon, det. as *equestris*. Oxford University Museum : Hogley, 1 ♀, 26.vii.1908. Manchester University Museum : Rinton Common, Cheshire, 1 ♀, 30.vii.1921, Warton Crag, Lancashire, 8.ix.1934 (*H. Britten*). Zoologisches Museum der Universität, Berlin : Sachsen, Gottleuba, 15 ♀♀, 1 ♂, 23, 24, 27, 28.vii.1894, and 1, 2, 5, 11, 16.viii.1894, Oberholz, 2 ♀♀, 8.vii.1893, Ober-Lausitz, Schirgiswalde, 7 ♀♀, 25, 26, 30.vii.1893 (*Dr. H. Krieger*). Zoologisches Museum, Hamburg : Haake, 1 ♀, 9.vii.1893 (*A. Tauber*), det. Schmiedeknecht as *falcatus*, Spanien, Pyrenäen, La Molina bei Puigcerda, 13–1500 m., 4 ♀♀, 3 ♂♂, 1–2.vii.1930 (*F. Diehl* u. *G. F. Meyer*). Bundesanstalt für Pflanzenschutz, Wien : Liebenau, O.Oe., 6 ♀♀, 1 ♂, 13, 18.vii.1932, 9, 11, 13.viii.1932, Arbesbach, NÖ., 4 ♀♀, 10.viii.1932. Reinhard Collection : 1 ♀ (now the *neotype*), 1 ♂. R. Istituto di Entomologia, Bologna : 2 ♀♀, det. et vend. Schmiedeknecht as *falcatus*. Universitetets Zoologiske Museum, Copenhagen : Schlick Collection, Langeland, Flaaddet, a card of four (4 ♀♀), 10.viii.1883, 3 ♀♀, 9, 21, 22.viii.1885, Sjaelland, Geelskov, a card of three (3 ♀♀), 19.vii.1885, Borup at Svendstrup, 1 ♀, 21.vii.1882, Dyrehaven, 1 ♀, 10.viii.1879, 1 ♀, 9.viii.1891 (which latter single ♀ det. as *falcatus*), Ørholms Faelled, 1 ♀, 9.viii.1876, Lolland, Ryde at Maribo, 1 ♀, 24.vii.1877. A. C. W. Wagner's Collection : Quickborn, 1 ♀, 27.vii.1901, ser. no. 592, det. as *formosus* [!], S. Tirol, 1 ♀, vii.1901, ser. no. 650, Schweiz, Territet, Genfersee, 1 ♀, 9.ix.1902. C. Ferrière's Collection : La Bessée, Htes-Alpes, 1 ♀, 1 ♂, 1925, det. *priapus*, probably cotypes but not so labelled, Vevey, Les Pleïades, 24 ♀♀, vi.1922 (*C. Ferrière*), det. Ferrière as *falcatus* Helvetia, Umgb., Aarau, 1 ♀, 16.viii.1926, det. Ferrière as *falcatus*, and N. Zernez, 1 ♂, 26.vii.1926.

Further material examined :—Reinhard Collection, 3 ♀♀, 1 ♂, det. *falcatus*.

Type of *falcatus* Nees, is lost : *neotype* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26943. *Type* of *equestris* Hal., in the British Museum. *Type* of *priapus* Gautier & Cleu, presumably either in Gautier's or Cleu's Collection; two cotypes in the British Museum.

Host. The original descriptions of both *falcatus* and *equestris* are without any host record; *priapus* was described as a parasite of the Agrotid *Hadena*, now *Agroperina*, *lateritia* Hufn.

Bignell recorded that he bred *A. falcatus* from the Agrotid *Xylophasia polyodon* L., a species now known as *Parastichtis monoglypha* Hufn., and the

two cards of six and four are so labelled. Ferrière's large series was bred from a caterpillar he collected himself, and this caterpillar has been determined for me by Mr. Tams as unquestionably *P. monoglypha*. Bridgman's two cards of two, presented to him by Bignell, were bred from this host also, but all the remainder of the material from which I have made my redescription is without host record.

Bignell also records that he bred this species from the Pterophorid *Leioptilus microdactylus* Zett., a species now known as *Pterophorus osteodactylus* Zell.; and he states that in this case the parasite is solitary. Surely some mistake has been made over this record; and it should be remarked that there was no material under *falcatus* in the Bignell Collection labelled from this host.

Cocoons white, arranged, like a pile of drain-pipes, regularly side by side and one above the other, in rows, so that both ends are exposed; but often with some few irregularly placed. When the parasite occurs in numbers on one caterpillar, there are several such piles of cocoons (cf. *Apanteles pistrinariae* Wilkn., 1932, *Trans. ent. Soc. Lond.* **80 :** plate 17, fig. 2).

Commentary. Nees originally described his *falcatus* from apparently a pair of specimens, this material comprising a single female captured by himself and a single captured male in the Gravenhorst collection. All the Nees and Gravenhorst material is, of course, lost or unrecognisable.

The first reviser of *falcatus* Nees, is Reinhard 1881. This author redescribed Nees's species from an unstated number of both females and males, and remarked that the species was very commonly captured but apparently not yet bred. In the Reinhard Collection under this name are four females and two males. This material agrees perfectly with Reinhard's description, and also, which is as important, with Nees's original description, and is quite obviously to be accepted as the series from which a neotype must be selected : and as may be seen above I have selected a female as the neotype, and so labelled it.

There is no question in my mind but that this series of Reinhard's is the same species that Nees described as *falcatus*. It is unquestionably the same species that authors have taken as *falcatus*.

Haliday originally described his *equestris* from an unstated number of specimens of both sexes in the collection of the Entomological Society of London, " (*Mus. Soc. Ent.*) ", the material having been captured, the habitat being given as " in pratis herbidis aestate et autumno passim frequens; in floribus Jacobeae apricans." In the British Museum, amongst the material presented by the Entomological Society and bearing the correct museum register number showing that it was part of this material, but otherwise unlabelled save for a figure, 20, and not standing under any name-label, was a single female agreeing perfectly and in the minutest detail with Haliday's original description. Further, this female specimen agrees perfectly with all the material I have before me of *falcatus* Nees, and the males of this latter have their genitalia exactly as described by Haliday for his *equestris*, " forceps analis ingens penitus exertus." I am convinced that this specimen should be accepted as the type of *equestris*, and I am so labelling it. It should be remembered also that all writers have sunk *equestris* under *falcatus*, not even excluding Reinhard, the first reviser; all of which is eminently satisfactory.

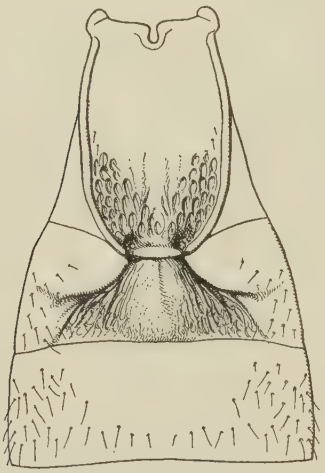
Gautier and Cleu originally described their *priapus* from twenty-four examples, and as a parasite of *Hadena lateritia* Hufn., from La Bessée-sur-Durance, Htes-Alpes. On my request, Dr. Gautier was so good as to present to the British Museum a pair of cotypes, and to these I have referred above. These specimens are unquestionably referable to *falcatus*.

Apanteles triangulator Wesm.

Microgaster triangulator Wesmael, 1837, *Nouv. Mém. Acad. Brux.* **10** : 62. *Apanteles triangulator* Wesmael, Lyle, 1917, *Entomologist* **50** : 194, pl. 2, fig. 4.
Apanteles abjectus Marshall, Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 410 (**partim.**).

♀♂. Black; the front tibiae and tarsi, apical three-fifths of the front femora, the middle femora at extreme apex, the middle tarsi more or less, about the basal half of the middle tibiae and basal sixth of the hind tibiae, red testaceous; hind tarsi slightly darkened; palpi and tibial spurs pale; wings hyaline; the costa, stigma, metacarp, and radial, transverse cubital, and pigmented portion of 2nd cubital veins, red-brown; stigma uniformly opaque; majority of remaining veins colourless.

♀♂. *Head*: clypeus, face, frons, and vertex, with fairly closely placed, regular, minute punctation (degree 1); facial depression large, very obviously nearer to apex of clypeus than to the eyes; antennae of ♀ about equal to, and of ♂ rather longer than, combined



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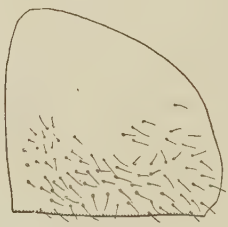

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Fig. 88.—*Apanteles triangulator* Wesmael; basal tergites, ♀.
Fig. 89.—*Apanteles triangulator* Wesmael; apical ventrite, ♀.

length of head, thorax, and abdomen. *Thorax*: mesonotum throughout with rather closely placed, regular, minute punctation (degree 2); scutellar sulcus regularly curved, the transverse impression on the notum in which it runs not strong; disc of scutellum with exceedingly minute, virtually obsolete, sparsely placed punctures; the non-excavate area of the lateral faces of the scutellum large, reaching up beyond middle of scutellum; propodeon with sparse obsolete punctation in the basal three-fourths, and sparse, weak rugose carination all across the apex. Venation regular, distinctive on account of the length of the upper portion of basal vein, in conjunction with the broad stigma, and the 1st abscissa of radial being equal to transverse cubital. *Legs*: hind coxae basally above more usually with a group of distinct punctures (degree 3), otherwise above and the outer faces with only very sparsely placed and exceedingly minute punctation, or impunctate; hind tibial spurs equal, or at least subequal, half the length of the basal joint of the hind tarsus. *Abdomen* (fig. 88): 1st tergite very slightly excavated in about the basal half, smooth and shining in about the basal two-thirds, weakly turned over and very weakly to obsoletely rugose in about the apical third or fourth; 2nd tergite often, particularly in the larger specimens,

with obsolete, longitudinal striation; 2nd suture fine; 3rd tergite longer than 2nd (14 : 10), and as the succeeding tergites smooth save for a transverse row of minute (degree 1) punctures; hypopygium (fig. 89) with its lower posterior angle just slightly excised; ovipositor sheaths very short.

Length, 2·0–2·5 mm.

Redescribed from the following material:—British Museum: Lyle Collection, a card of nine specimens (apparently 5 ♀♀, 4 ♂♂), numbered 202, New Forest, 28.vii.1905 (*G. T. Lyle*), and a card of seven specimens, numbered 4706, Somerset, 1914. Bignell Collection: a card of six (5 ♀♀, 1 ♂), numbered 2869, and a card of four (4 ♀♀), dated 16.vii.1885 and also numbered 2869. Bridgman Collection: a card of two (1 ♀, 1 ♀?) bearing the Bignell serial number 2869. Imperial Institute of Entomology: France, Montpellier, 5 ♀♀, vii.1932, Bordeaux, 3 ♀♀, 1 ♂, 1 ?, 30.vi.1933 (*J. Suire*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Berlin, 13 ♀♀, 5 ♂♂, 18.viii.1902 (*Dr. G. Enderlein*), 17 ♀♀, 3 ♂♂, 10.ix.1902 (*M. Ude*). A. C. W. Wagner's Collection: Boberg, 4 ♀♀, 25.vii.1916; and 1 ♂, undated. Zoologisches Museum, Hamburg: Sachsenwald, 2 ♀♀, 2 ♂♂, 27.vii.1895 (*A. Sauber*), Bahrenfeld, 2 ♀♀, 1 ♂, vii.1896 (*Kalbe*).

Type series in the Musée Royal d'Histoire Naturelle, Brussels; register serial no. 2016.

Host. The type series is without host record, as are also the two French series referred to above and the single undated male. All the remainder of the above material was bred from the Geometrid *Pseudoterpna pruinata* Hufn., a species often referred to as *cythisaria* Schiff. Lyle records that the host of his series numbered 4706 came from Somerset and was given to him by Slater. The host of Bignell's series was obtained by a Mrs. Hutchinson near London.

Marshall (1885) states that Giraud records this species to be a parasite of the Lycaenid butterfly *Thecla w-album* Knoch, and that W. H. B. Fletcher bred a ♂ from the Tineid *Psychoides*, now *Teichobia*, *verhuellella* Stn., and Billups a female from the Geometrid *Boarmia rhomboidaria* Schiff. (= *gemmaria* Brahm); but these statements are to be treated with reserve (see below). He also records that Brischke bred it from the Notodontid *Stauropus fagi* L., as well as from *P. pruinata*.

In Bignell's copy of Marshall's 1885 monograph is a MS. note against *triangulator* (11 Aug. 1888) to a specimen, ser. no. 3623. This, it appears from the note, had been bred from the Lymantrid *Dasychira pudibunda* L.; the specimen is not *triangulator*.

Also, in the Bignell Collection was a cardful of six specimens under the name *triangulator*, serial number 3159, bred from the Noctuid *Amphipyra pyramidea* L., by Dr. Chapman; these also are not *triangulator*.

Morley (1906) records that Sich bred one specimen from the Tineid *Coleophora gryphipennella* Bouché, at Chiswick in June; but I have not been able to examine it.

Cocoons. The cocoons, heaped indiscriminately together in a small compact mass, which is rarely half an inch long, have the appearance of being very tightly pressed against each other. Their colour is white, or possibly very pale yellow. Each of the series from which this species has now been redescribed has its cocoon mass preserved.

Lyle (*loc. cit.*) says that these "compact parcels of cocoons may often be found in June attached to *Genista angelica* and to furze," that the broods usually consist of from ten to twenty individuals, and that he imagines the species will be found to be as common and as widely distributed as is its host, *P. pruinata*.

Commentary. Wesmael originally described this species from a series of two females and six males that emerged from a mass of cocoons collected near Boisfort, Belgium, attached to a blade of grass. In Wesmael's collection in Brussels there is a series of two females, four males (apparently), and one specimen of indeterminable sex (abdomen missing and otherwise damaged), with a mass of cocoons, that stands under this name. This is obviously the original series, and the specimens agree perfectly and in the minutest detail with those of the two series from France that I have referred to above and with which I myself compared it.

As Lyle has pointed out, the earlier writers seem to have been uncertain as to this species. Various authors refer to white, solitary cocoons; for example, Brischke even saying that the cocoons are single *or* gregarious. Marshall's descriptions, also (1885), do not quite agree with the material before me; and as I have not seen any of the specimens to which he refers, not even the male that he himself caught, which, one would have thought, should be in his collection in the British Museum, his records should be only accepted with considerable reserve—it will be noted that references to his works are not included by me in the synonymy of the species. In addition, the Bignell series numbered 2869 (referred to above) had not only been identified as *abjectus* Mshl., by, presumably, Bignell or Marshall, and placed under this name both in Bignell's and in Bridgman's collection, but also was even selected, I cannot understand why, by Hodgson as the type series of this latter. Hodgson was wrong, of course, for reasons as shown under *abjectus* in this present work. Finally, there was a further series of six specimens standing in Bridgman's collection under the name *triangulator*, which were not this species.

It is of interest, also, to record that the material from Sachsenwald is labelled to have been determined by Schmiedeknecht in 1898 as *A. spurius* Wesm., that from Bahrenfeld as *geryonis* Marsh., and the single male from Wagner's collection as *sodalis* Hal. ! ! This single male also bears another determination label (whose I do not know) giving the name as *bignelli* Marsh.

Apanteles fraternus Reinh.

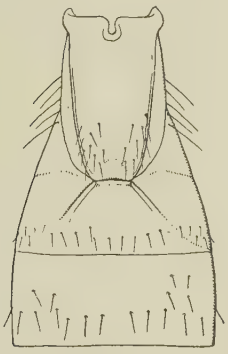
Apanteles fraternus Reinhard, 1881, *Deuts. ent. Z.* **25** : 47–48. Bignell, 1883, *Entomologist* **16** : 166. Fitch, 1884, *Entomologist* **17** : 68. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 214; 1888, *Spécies Hymen. d'Eur.* **4** : 477. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 675. Lyle, 1917, *Entomologist* **50** : 193–194.

♀. Black; the front femora very commonly, and the middle femora sometimes, red testaceous at extreme apex; all tibiae apically darkened, strongly darkened, or even black, but becoming increasingly more red testaceous towards the base, in the more lightly coloured specimens distinctly red testaceous basally, but in the darker specimens with this basal testaceous colouring hardly apparent, considerably restricted, or even entirely wanting; hind tibiae in darker specimens commonly entirely black; all tarsi darkened, in the darker specimens strongly darkened and the hind tarsi commonly black; palpi darkened, sometimes strongly darkened or even black; tibial spurs pale; wings slightly infumated, and the setae coloured; wing-veins, stigma, and metacarp, brown or red-brown; stigma uniformly opaque.

♂. Agrees with colour description of ♀ save as follows :—Wings white hyaline, and the setae white; costal veins, stigma, metacarp, 1st abscissa of radial, transverse cubital, and the 2nd abscissa of cubital, brown or red-brown, the remaining veins colourless.

♀♂. *Head* broader than mesonotum; clypeus, face, frontal orbits, frons, and vertex, pruinose and minutely punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli rather nearer to each other than to the eyes; flagellum

rather shorter than the combined lengths of the head, thorax, and abdomen, save perhaps in the smaller examples where it would seem to be about equal to this combined length. *Thorax*: mesonotum pruinose, throughout with evenly and rather closely placed, minute punctation (degree 2); disc of scutellum smooth save for some exceedingly minute punctation (degree 1), which is clearly much more widely placed than that on the mesonotum; propodeon highly shining and entirely smooth save for two small groups of exceedingly minute (degree 1), distinctly separated punctures, each group being so placed as to occupy about two-ninths of the basal two-fifths of the propodeon, with an impunctate median one-ninth separating them. *Legs*: hind coxae basally above minutely punctate (degree 2), otherwise above and on outer faces smooth and shining with some few, widely scattered,



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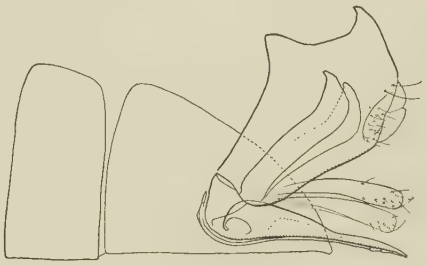

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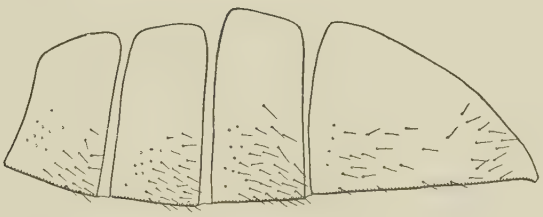

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Fig. 90.—*Apanteles fraternus* Reinhard; basal tergites, ♀.
Figs. 91 & 92.—*Apanteles fraternus* Reinhard: 91, genitalia, ♀; 92, apical ventrites, ♀.

minute punctures; the hind tibial spurs subequal in length, just shorter than half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 90, 91 and 92): 1st tergite basally weakly excavate, apically weakly turned over, throughout highly shining and entirely smooth save for minute punctation in the apical third or fourth, these punctures in the ♀ as a rule quite distinctly fewer in number and more sparsely placed than in the ♂; 2nd tergite entirely smooth save for its diverging discal sulci and for a transverse row of minute punctures right across the apical half; these discal sulci tend to be variable as to their angle of divergence, and they rarely if ever reach the apex of the tergite, more usually (but far from invariably) reaching only about half-way down the tergite and short of the row of punctures, and here much widened out they become lost; in many examples, however, it is apparent that these sulci extend beyond the row of punctures; the punctures of the transverse row in the 2nd tergite are more usually fewer and rather more widely separated from each other in the ♀ than in the ♂, in the ♂ often being so numerous that they are not in a line but seeming to form more or less two transverse rows; 3rd tergite smooth and shining, in the ♀ with a single transverse row of minute punctures across near the base of the apical two-fifths, and commonly with three or four other minute punctures laterally in

the basal half, in the ♂ with much more numerous and more extensively placed minute punctures, entirely smooth only right across the base and the apex and in a large median area in the basal half; succeeding tergites in the ♀ with a single row of minute punctures, which are well separated, in the ♂ noticeably much more extensively punctate; ventrites of ♀ without median longitudinal suture; ovipositor rather longer than, and the ovipositor sheaths rather shorter than, the basal joint of the hind tarsus; hypopygium apically slightly, but quite distinctly, decurved, and in addition with its extreme apex just slightly cut away.

Length, 1·5–2·5 mm., more usually about 1·8 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a card of two (1 ♀, 1 ♂), ix.1881 (*G.C.B.*); Lyle Collection, Sandbanks, Poole, a cardful of forty-six (5 ♀♀, 41 ♂♂), 2.vii.1916, ser. no. 2929 (*G. T. Lyle*), a cardful of twenty-eight (19 ♀♀, 9 ♂♂), 4.vii.1916, ser. no. 2931 (*G. T. Lyle*), and a cardful of eighteen (15 ♀♀, 3 ♂♂), 17.vii.1916, ser. no. 2965 (*G. T. Lyle*), all determined by Lyle as *fraternus*; Guernsey, 64 ♀♀, 14 ♂♂, 16.ix.1924 (*E. E. Green*); Exmouth, England, 5 ♀♀, 14 ♂♂, *undated* (*C. H. Rudge*), determined as *fraternus* by James Waterston. Bignell Collection: a cardful of six (6 ♀♀), ser. no. 240, for which Bignell's register gives the date as 20.ix.1881, records that the material had been received from Harwood and that Fitch retained one lot, and gives the determination as *fraternus*; another cardful of six (6 ♀♀), 16.ix.1885, determined as *fraternus*, and with ser. no. 2992, the register recording further that this lot was received from Harwood. Bridgman Collection: a card of two (2 ♀♀), ser. no. 1010, for which his register records the material to have been received from Bignell, determined as *fraternus*. Fitch Collection: a card of five (5 ♀♀) (originally six), ser. no. 240, det. as *fraternus*. Harwood Collection: St. Osyth coast, a cardful of four (4 ♀♀), four (4 ♀♀), three (2 ♀♀, 1 ♂), and one (1 ♀), 31.viii.1914; Colchester, a card of two (2 ♀♀), 1914, and another of two (2 ♀♀), ix.1914; St. Osyth, a cardful of six (2 ♀♀, 4 ♂♂), and another of three (2 ♀♀, 1 ♂), x.1914; and a cardful of four (4 ♀♀)—all determined as *fraternus*. University Museum of Zoology, Cambridge: Hunstanton, Norfolk, 41 ♀♀, 33 ♂♂, 13.vii.1936 (*G. J. Kerrich*). Zoologisches Museum der Universität, Berlin: Germany, 60 ♀♀, 14 ♂♂, 20.vi.1896. A. C. W. Wagner's Collection: Haake, 3 ♀♀, 3 ♂♂, 17.vi.1906, 1 ♀, 6 ♂♂, 6, 7.vii.1909; Rosengarten, 3 ♀♀, 6.vii.1909. C. Ferrière's Collection: Wallis, Lötschental, 12 ♀♀, 12 ♂♂, 4.vii.1918 (*C. Ferrière*); Tence, H.-L., 3 ♀♀, 5.vi.1925. Imperial Institute of Entomology: Montpellier, France, 1 ♀, 3 ♂♂, v.1932 (*J. Suire*); Dungeness, Kent, cardfuls of twelve (4 ♀♀, 8 ♂♂), eighteen (4 ♀♀, 14 ♂♂), seventeen (17 ♂♂), and thirteen (3 ♀♀, 10 ♂♂), ix.1932 (*Dr. Bull*); Rochford, Essex, a cardful of ten (8 ♀♀, 2 ♂♂), and another of nine (9 ♀♀), ix.1933 (*Hugh Main*).

Further material examined:—Reinhard Collection: 9 ♀♀ (one the *type*), 1 ♂ (*Rogenhofer, Wien*).

Type in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial numbers 26973, 26974, and 26975.

Host. The original description of *fraternus* is without host record. Of the material from which I have redescribed this species, the Bignell series are recorded in his register and in his short notes in the *Entomologist* and the *Transactions of the Devon Association* to have been bred from the Geometrid *Aspitates*[6] *citraria* Hübn., a species now known as *ochreata* Rossi. From this host Lyle believes

[6] The generic name *Aspitates* is commonly spelt *Aspilates*, and in error, so I am informed by Mr. Tams.

that he also bred the material that is in his collection and to which he refers in his paper in 1917, while Hugh Main's material, which was lent to me for study by K. G. Blair, was, according to Blair, also bred from this Geometrid. Fitch in his paper lists this host too, of course. The material from the Berlin Museum, and also Herr Wagner's material dated 1909, is recorded to have been bred from the Geometrid *Aspitates*, now *Perconia*, *strigillaria* Hübn. The remainder of the Wagner material is recorded from the Geometrid *Selidosema ericetaria* Vill., now known as *plumaria* Schiff. M. Suire's material is labelled to have been bred from "*Eurranthis plumistaria*," by which, doubtless, is meant the Geometrid *Fidonia plumistaria* Vill. Finally, the Harwood material from Colchester and also the Harwood material dated x.1914 is labelled, as noted by Lyle in 1917, to have been bred from the Agrotid *Euclidia mi* Clerck. The remainder of my material is without host record.

Morley (1906) records "one" from the Tineid *Bucculatrix cristatella* Zell., and Szépligeti (1896) the Agrotid *Acronicta aceris* L.; but I have not seen their material and consequently cannot vouch for the determinations.

Cocoons in an alveariform mass. In his original description Reinhard says that the yellow-white cocoons, to the number of one hundred or more, are spun together in the form of a honeycomb, the edge of which is fastened in a neat manner to a thin twig or stalk so that the cocoons lie transversely. Lyle remarks that in all cases he has noticed the masses of cocoons have been in an almost semicircular form, caused by the parasite larvae filling up the space between the body of the host and the twig upon which it rested. He states further that he was fortunate enough to witness the spinning of the cocoons, and that it certainly seemed as if the host, a Geometrid larva, encouraged the formation of the semicircular shape by accommodatingly arching its body; previous to the emergence of the parasites it had been stretched almost straight along the twig.

This is the only known palaearctic species of *Apanteles* with an alveariform cocoon-mass.

Commentary. Reinhard originally described this species from an unstated number of both females and males, mentioning that they had emerged from an alveariform cocoon-mass, and adding that many examples collected by Rogenhofer are to be seen in the Vienna Museum. In the Reinhard Collection standing under this name are five females and an alveariform cocoon-mass, all labelled as type, and the cocoon-mass with an additional label, "Rogenhofer, Wien". In addition, under the label "var", there are a further four females and a male, also all labelled as type. All this material agrees together perfectly and as well as can be expected with Reinhard's description, and it is quite obviously to be accepted as the original series. It agrees perfectly and in the minutest detail with the material from which I have made the redescription and with the majority of which I myself compared it.

Apanteles coniferae Hal.

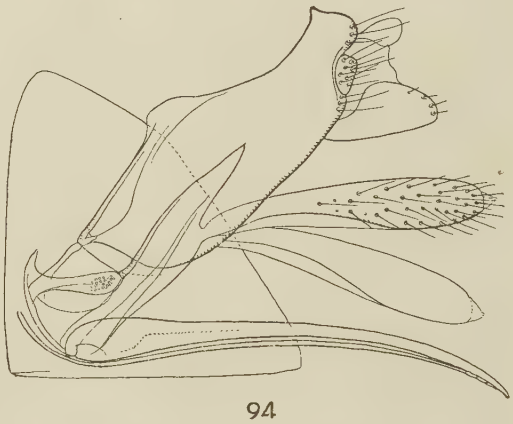
Microgaster coniferae Haliday, 1834, *Ent. Mag.* **2**: 247.

♀. Black; front legs entirely (save for the black coxae and feet), middle trochantines, middle tibiae, middle tarsi (save for black feet), hind tibiae (save very occasionally for some very slight darkening at apex), hind tarsi (save for black feet and darkened apical segments), and tegulae, red testaceous; middle femora basally, and above and below in at least basal half, darkened or black, otherwise red testaceous; hind femora red testaceous at extreme base below and at extreme apex, otherwise black or strongly darkened, very occasionally

throughout length broadly darkened or black above and below and red testaceous medially; palpi and tibial spurs pale; wings slightly infumated evenly throughout, and the setae coloured; costal veins throughout or largely red testaceous; stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins colourless or but slightly pigmented; stigma uniformly opaque.

♂. Black; front trochanters (save for some occasional darkening), front trochantines,

93



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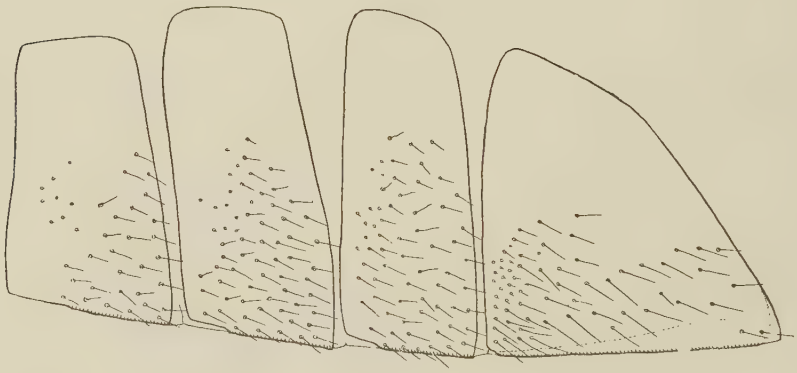

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Fig. 93.—*Apanteles coniferae* Haliday; basal tergites, ♀.

Figs. 94 & 95.—*Apanteles coniferae* Haliday: 94, genitalia, ♀; 95, apical ventrites, ♀.

front tibiae, front and middle tarsi (save for the black feet), middle femora at extreme apex, hind tibiae in basal fourth or third, basal half of basal segment of hind tarsus, and tegulae, red testaceous; front femora occasionally entirely red testaceous, but more commonly darkened to some extent above and below and basally; hind femora very occasionally with some minute indication of red testaceous colouring at extreme base below and at extreme apex; middle tibiae commonly entirely red testaceous, as commonly

darkened in or throughout apical half; hind tarsi otherwise darkened; palpi and tibial spurs pale; wings as in ♀.

♀♂. In the punctation on the face, clypeus, mesonotum, disc of scutellum, hind coxae, and 1st tergite, which is all describable as degree 2 and 3, the setae are inserted at a strongly acute angle and the integument is raised basad, with the result that these parts appear to be quite clearly punctate when viewed from the direction in which the setae are pointing, but to be pruinose when viewed from the opposite direction. *Head*: face and clypeus regularly punctate; frontal orbits, frons, and vertex, minutely punctate (degree 2); facial depressions equidistant from apex of clypeus and the eyes, or just nearer to apex of clypeus; posterior ocelli just nearer to each other than to the eyes; flagellum of ♀ equal in length to, or a little longer than, combined length of head, thorax, and abdomen, of ♂ equal to combined length of thorax and abdomen together with three times the length of the head, commonly equal to three times the length of the thorax. *Thorax*: mesonotum regularly punctate, entirely smooth in a small triangular area across apex; disc of scutellum punctate; the smooth, non-excavate area of lateral faces of scutellum not, or barely, reaching up half-way to base of scutellum; propodeon in basal half punctate in lateral thirds or two-fifths, smooth and perhaps slightly depressed medially, in apical half the apical lunule emitting an almost complete semicircle of carinulae, otherwise in apical half smooth. *Legs*: hind coxae basally and apically above punctate, at apex above longitudinally striate, on outer faces with widely separated punctation; the longer hind tibial spur half, and the shorter spur one-third, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 93, 94 and 95): 1st tergite basally excavate, apically turned over, the lateral thirds of the basal half dull, aciculate, and with an occasional puncture, the medial third of the basal half or four-sevenths shining and more or less smooth, the apical half punctate and with longitudinal carinulae, and the apical angles depressed; 2nd tergite with minute punctation in apical two-thirds, and possibly with some indefinite aciculation basally; 3rd tergite smooth narrowly across base and apex and in a large median basal triangle, otherwise with well-separated, minute punctation; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture, the 2nd–5th ventrites as strongly chitinised medially as elsewhere; 3rd ventrite of ♀ sometimes with median longitudinal excision in about basal three-sevenths; 4th and 5th ventrites of ♀ with median longitudinal excision in basal fourth; hypopygium of ♀ not describable as membranous throughout the median line but as just a little less strongly chitinised here than elsewhere, without median longitudinal suture, its apex acute but not membranously so, perhaps just slightly rounded at extreme apex; ovipositor sheaths equal in length to the basal segment of the hind tarsus, the ovipositor rather shorter than the hind femur, rather longer than combined length of the two basal segments of the hind tarsus.

Length, 2·25–2·75 mm.

Redescribed from the following material :—Naturhistoriska Riksmuseum, Stockholm : Germany, Saxony, 1 ♂, no. 42 (*Herr Schutze*). O. W. Richards's Collection : Slough, Bucks, 1 ♀, 1 ♂, nos. 11158, 9832A, 7.vi.1937, 1 ♀, no. 9480, em. 3.vi.1938, 1 ♀, 2 ♂♂, nos. 10065, 10147, 9655.218, em. 2.viii.1936 (*O. W. Richards*). D. S. Wilkinson's Collection : England, Kent, Bexley, 6 ♀♀, 9 ♂♂, coll. 17.vi.1937, em. 1.vii.1937, 4 ♂♂, em. 18.vi.1939, 4 ♂♂, coll. 10.vi.1939, em. 4.vii.1939 (*R. L. E. Ford*).

Further material examined :—National Museum of Ireland, Dublin : Haliday Collection, 1 ♀, no. 1121 (*type*), 1 ♂, no. 1131, 2 ♀♀, no. 14.

Type in the National Museum of Ireland, Dublin.

Host. The original description of *coniferae* is without host record. All the material from which I have redescribed the species was bred, as a solitary parasite, from the Tineid *Swammerdamia lutarea* Haw., save for Schutze's single

male, which is recorded simply from a species of *Swammerdamia*, and for the two specimens dated 7.vi.1937, which were bred from cocoons found on hawthorn, the plant on which *lutarea* feeds.

Cocoons white, solitary.

Commentary. Haliday originally described his *coniferae* from an unstated number of both females and males, from his own collection, since he mentioned no other, as was his habit when describing some material from some collection other than his own, and from material that apparently had not been bred, since he gave the habitat simply as " in Laricetis minus frequens." In the remains of the Haliday Collection in the Dublin Museum are three females and a male. Of these, two of the females are labelled, in the minute handwriting usual for this collection, " *coniferae* ", one of them in addition being numbered on the card, " 14 ", and the other, on a label, " 1121 " ; and the male is labelled " 1131 ", and the remaining female numbered " 14 " on the card. These four specimens agree perfectly with Haliday's original description, and are obviously to be accepted therefore. I propose to accept the female numbered 1121 as the type; and I am so labelling it. They agree perfectly and in the minutest detail with all the other material before me from which I have redescribed the species.

Marshall (1885, 1888) has written under the name *coniferae*, but the material to which he refers, namely a female in Fitch's collection, is not in fact this species.

Apanteles corvinus Reinh.

Apanteles corvinus Reinhard, 1881, *Deuts. ent. Z.* **25** : 46. Kemner, 1917, *Medd. Centralanst. försöks. jordb.*, no. **161** (Ent. Avd., no. 28) : 24.
Apanteles exilis Haliday, Reinhard, 1881, *Deuts. ent. Z.* **25** : 44.

♀. Black; front femora extensively in apical half, front and middle tibiae throughout, front and middle tarsi (save for darkened apical joint and feet), extreme apex of middle femora, hind tibiae in basal fourth or third, the hind tarsal segments basally to some extent, red testaceous; middle tibiae and tarsi often darkened to some extent, occasionally extensively and even strongly darkened; palpi and tibial spurs pale; wings infumated evenly throughout, and the setae coloured; costal veins in part light brown, in part red testaceous; stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins with some light brown pigmentation; stigma uniformly opaque.

♂. Black; front femora at apex, middle and hind tibiae at base, red testaceous; front tibiae and tarsi darkened; middle and hind tibiae occasionally entirely black; palpi more usually pale, sometimes darkened; tibial spurs pale; wings hyaline, and the setae colourless; venation very variable in colour, either, the costal veins, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins with some light brown pigmentation, and the stigma uniformly opaque, or,[7] the costal veins, periphery of stigma, and the metacarp, light brown, the 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, with some light brown pigmentation, the remaining veins entirely colourless, and the stigma discally hyaline.

♀♂. *Head*: face and clypeus with rather closely placed, minute punctation (degree 2); facial depressions much nearer to apex of clypeus than to the eyes; facial and frontal orbits, frons, and vertex, with exceedingly minute (degree 1) punctation; posterior ocelli rather nearer to each other than to the eyes; flagellum of ♀ equal in length to or just a little longer than combined length of head, thorax, and abdomen, of ♂ about equal to combined length

[7] The second condition perhaps due to immaturity.

of thorax and abdomen together with three times the length of the head, approaching three times the length of the thorax. *Thorax*: mesonotum throughout regularly and rather closely punctate (degree 3), entirely smooth narrowly across extreme apex; disc of scutellum with punctation (degree 3) that is widely separated medially and more closely placed along the sides; non-excavate area of lateral faces of scutellum perhaps just reaching up half-way to base of scutellum; propodeon in basal half with some exceedingly minute punctation (degree 1) on each side, in apical half with some few short carinulae radiating from the median apical lunule, otherwise entirely smooth. First abscissa of radial and transverse cubital slightly angled and more or less of equal length. *Legs*: hind coxae basally above strongly punctate (degree 4), or at least with some few such punctures, apically above minutely punctate, and at apex above longitudinally striate, on outer faces with widely

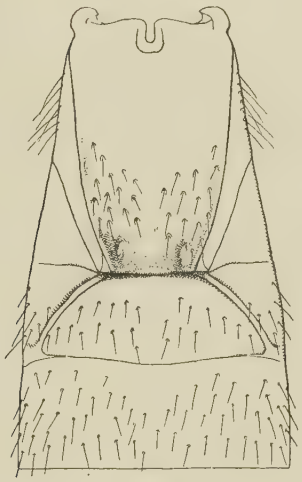

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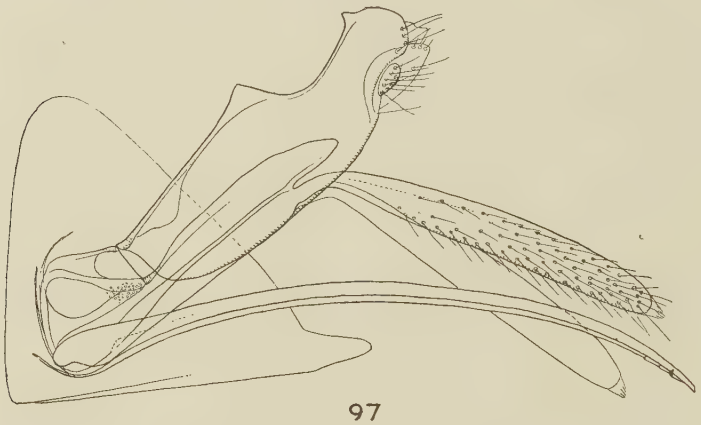
Fig. 96.—*Apanteles corvinus* Reinhard; basal tergites, ♀.

separated, minute punctation; the longer hind tibial spur rather more than half, and the shorter spur about two-fifths, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 96, 97 and 98): 1st tergite regularly turned over, basally excavate, medially not tumescent, in basal half entirely smooth and highly shining, in apical half punctate (degree 2 or 3), at apex commonly with some aciculation; 2nd tergite with widely separated, minute punctation in apical half or two-thirds; 3rd tergite smooth across base and apex and in a median basal area, otherwise minutely punctate; succeeding tergites minutely punctate; 3rd and 4th ventrites of ♀ without median longitudinal suture, medially at base with a small excision; 5th ventrite of ♀ with median longitudinal suture; hypopygium of ♀ broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths just shorter than the hind femur; the ovipositor longer than the hind tarsus, about equal to combined length of the hind tibia and basal segment of the hind tarsus.

Length, 2·25–2·5 mm.

Redescribed from the following material:—Zoologisches Museum der Universität, Berlin: Berlin-Frohnau, 1 ♀, 5.vi.1927 (*O. & H. Hering*), Gudhjem, Bornholm, 1 ♀, 10.viii.1927. Naturhistorisches Museum, Wien: Schweden, Trövad, 2 ♀♀, 13.vii.1916 (*N. A. Kemner*), det. as *corvinus* Reinh.

Naturhistoriska Riksmuseum, Stockholm: Germany, Saxony, 1 ♀, no. 217 (*Herr Schutze per Dr. A. Roman*). O. W. Richards's Collection: Westmorland, Ullswater, 1 ♀, no. 40431, 24.vi.1936, em. 21.vii.1936, Slough, Bucks, 1 ♀, no. 9311, 1 ♀, no. 9634, 1 ♂, no. 9633, 1 ♂, no. 42648, em. 2.vi.1938, 1 ♀, no. 11351, 16.v.1939, em. 27.v.–3.vi.1939 (*O. W. Richards*). A. C. W. Wagner's Collection: Vierlande, 1 ♀, no. 387, det. Schmiedeknecht as *nanus* Reinh. D. S. Wilkinson's Collection: England, Kent, Bexley, 8 ♀♀, 6 ♂♂, coll. 17.vi.1937, em. 1.vii.1937, 8 ♀♀, 2 ♂♂, em. 18.vi.1938, 3 ♀♀, 6 ♂♂,



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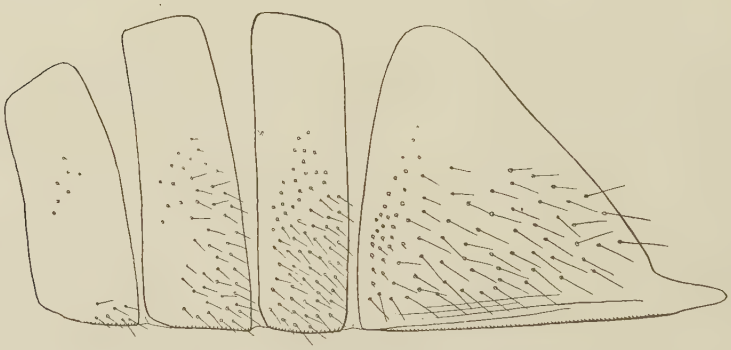

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Figs. 97 & 98.—*Apanteles corvinus* Reinhard: 97, genitalia, ♀; 98, apical ventrites, ♀.

coll. 10.vi.1939, em. 4.vii.1939, 2 ♀♀, 1 ♂, 7.vii.1939, Middlesex, Osterley, 1 ♀, coll. 20.v.1939, em. 6.vi.1939 (*R. L. E. Ford*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Reinhard Collection, 3 ♀♀ (one the *type*), 1 ♂, 2 ♀♀, no. 7, mus. reg. no. 26963, det. Reinhard as *exilis* Hal.

Type in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26970.

Host. Reinhard originally described his *corvinus* from captured material; his material is therefore without host record. Of the material from which I

have redescribed the species, or which I have seen, Kemner's two females, as recorded by him in 1917, are labelled to have been bred from the Tineid *Coleophora fuscedinella* Zell., on birch, Richards' single female from Ullswater from this same host, on alder, and Wagner's single female, and Reinhard's two females incorrectly determined by himself, from a species of *Coleophora* on birch. On the other hand, the single female from Saxony is recorded from *Coleophora nigricella* Steph., and Richards's five specimens from Slough from this host on hawthorn. Ford's material from Bexley and Osterley was bred by him from the Tineid *Swammerdamia lutarea* Haw., on hawthorn, with the exception of the three specimens dated 6.vi.1939 which were swept from the same hawthorn hedge. Finally, the single female from Berlin is recorded to have been bred from a mine on *Crataegus oxyacantha*, and the single female from Bornholm from a mine on *Cotoneaster integerrima*.

Brischke (1882), Fahringer (1935), Marshall (1888), Niezabitowski (1910), Szépligeti (1896) and Rühl (1919), have all written under the name *corvinus*, but have given no other records of hosts.

Cocoons. When the host is *S. lutarea* the *Apanteles* cocoons are white and solitary, and are to be found in the small web made by the host larva. When the host is a species of *Coleophora*, pupation takes place inside the *Coleophora*-case.

Commentary. Reinhard originally described his *corvinus* from six captured specimens, comprising five females and one male. In the Reinhard Collection standing under this name are three females and one male. This material, which is clearly only one species, agrees perfectly with Reinhard's original description, and is quite obviously to be accepted as part of the original series. It agrees perfectly and in the minutest detail with all the material from which I have made my redescription and with various specimens of which I myself compared it.

Apanteles viminetorum Wesm.

Microgaster viminetorum Wesmael, 1837, *Nouv. Mém. Acad. Belg.* **10** : 50. *Apanteles viminetorum* Wesmael, Reinhard, 1881, *Deuts. ent. Z.* **25** : 42. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 199–200; 1888, *in* André, *Spécies Hymen. d'Eur.* **4** : 457–458. Bignell, 1887, *Rep. Plym. Inst.* **9** : 324; 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 673.
Microgaster fuliginosus Wesmael, 1837, *Nouv. Mém. Acad. Belg.* **10** : 52–53 (**syn. n.**).

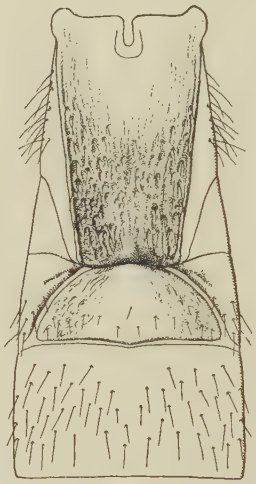
♀. Black; front femora in about apical half, front tibiae and tarsi wholly (save for the feet), middle femora apically, middle tibiae in about basal half, hind tibiae in about basal third or fourth, red testaceous; middle and hind tibiae otherwise, and middle and hind tarsi, more usually slightly darkened, commonly entirely red testaceous, often strongly darkened and more extensively so than as stated; palpi and tibial spurs pale; wings infumated and the setae coloured; stigma, metacarp, and wing-veins, uniformly light brown, with veins at base of wing testaceous; stigma uniformly opaque.

♂. Black; front femora at apex and along sides in apical half or third, all tibiae at base, middle femora occasionally at extreme apex, red testaceous; front tibiae otherwise, and front tarsi, darkened, occasionally only slightly darkened or even red testaceous, and the feet black; middle and hind tibiae otherwise, and middle and hind tarsi, strongly darkened; palpi darkened; tibial spurs pale; wings as in ♀.

♀♂. *Head*: face, clypeus, frontal orbits, frons, and vertex, minutely punctate (degree 2), in certain lights almost pruinose; facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes, or rather nearer to each other; flagellum of ♀ longer than combined length of head, thorax, and abdomen, but shorter than combined length of thorax and abdomen together with twice the length of the

head, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head. *Thorax*: mesonotum and disc of scutellum throughout regularly and closely punctate (degree 3), in certain lights almost pruinose; the smooth, non-excavate area of lateral faces of scutellum barely reaching up half-way to base of scutellum; propodeon closely, indefinitely punctate in lateral two-fifths of the basal half, otherwise throughout with fine, more or less longitudinal striation and aciculation, much of which radiates from the median apical lunule. Transverse cubital angled with, more usually equal to, but commonly noticeably longer than, the 1st abscissa of radial; stigma rather shorter

100



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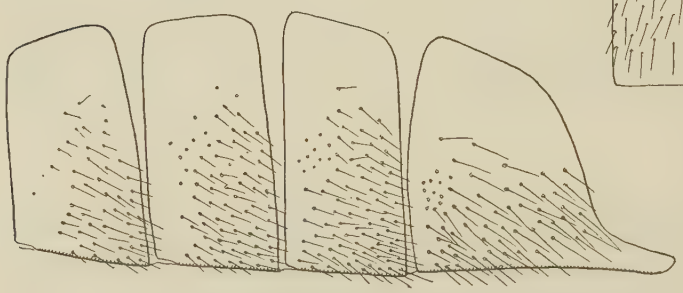

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Fig. 99.—*Apanteles viminetorum* Wesmael; basal tergites, ♀.
Figs. 100 & 101.—*Apanteles viminetorum* Wesmael: 100, genitalia, ♀;
101, apical ventrites, ♀.

than metacarp. *Legs*: hind coxae basally above with some well-separated, strong punctures (degree 4), otherwise above and on outer faces with well-separated, minute punctation (degree 2); hind tibial spurs equal, less than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 99, 100 and 101): 1st tergite basally excavate, apically turned over, throughout minutely rugose or at least aciculate, and the apical angles depressed, more usually with the sides slightly and more or less regularly converging apicad, but the sides often parallel or virtually so; 2nd tergite minutely aciculate to a varying extent and strength, never entirely smooth, minutely punctate in apical half or third; 3rd tergite broadly across base and apex and in a large median basal triangle smooth, otherwise with well-separated minute punctation; succeeding tergites minutely punctate; 3rd to 5th ventrites of ♀ without median longitudinal suture, as strongly chitinised medially as elsewhere, apparently often with a slight excision medially at base; hypopygium of ♀ without any sign of a median longitudinal suture, in at least apical half of median line broadly

somewhat membranous and its apex noticeably and strongly produced, basally more chitinised; ovipositor sheaths short and very broad, equal in length to the basal segment, the ovipositor very slender, rather shorter than combined length of the two basal segments, of the hind tarsus.

Length, 1·75–2·5 mm.

Redescribed from the following material:—British Museum: Marshall Collection, a card of three (1 ♀, 2 ♂♂), Bristol, 30.vi.1884, det. *viminetorum* Wesm.; General Accessions, Gloucestershire, Staunton, High Meadow Woods, 6 ♀♀, 9 ♂♂, 5, 9, 11.vi.1936, Forest of Dean, Cannop Ponds, 1 ♂, 8.vi.1936 (*E.B.B. & J.F.P.*), Buckinghamshire, Princes Risborough, 7 ♀♀, 4 ♂♂, 25.vi.1938, Hampshire, Southampton, 2 ♂♂, vi.1938, Hertfordshire, Boxmoor, 1 ♀, 3.vi.1936, Brickett Wood, 1 ♀, 10.v.1938 (*R. B. Benson*), Inverness-shire, Aviemore, 3 ♀♀, 11, 26.vi.1934 (*R. B. & J. E. Benson*), Sweden, Skåne, Höör distr., 57 ♀♀, 39 ♂♂, 5, 9, 11, 13, 14, 16, 17, 18, 22.vi.1938, Ringsjö, 4 ♀♀, 14 ♂♂, 6, 7, 12, 27.vi.1938, Löderup, 3 ♀♀, 21 ♂♂, 24, 26, 27.vii.1938, Skäralid, 4 ♀♀, 2 ♂♂, 1, 3.vii.1938, Röstanga, 5 ♀♀, 2 ♂♂, 2, 4, 6.vii.1938, Degaberga, 2 ♀♀, 1 ♂, 8, 10, 11.vii.1938, Fjellfota, 1 ♀, 1 ♂, 31.vii., 7.viii.1938 (*D.M.S.P. & J.F.P.*). Zoologisches Museum der Universität, Berlin: Pommern, 1 ♀, 1 ♂, *undated* (*Hering*); Rangsdorf, 1 ♀, 25.v.1924 (*Bischoff*). Universitetets Zoologiske Museum, Copenhagen: Alleskoven Faaborg, a card of five (3 ♀♀, 2 ♂♂), and 3 ♀♀, 2 ♂♂, coll. 29.iii.1923, em. 7, 12, 14, 15, 17.v.1923 (*C. S. Larsen*). Imperial Institute of Entomology: Germany, Saxony, 3 ♀♀, ser. no. 267, 1 ♀, 4 ♂♂, ser. no. 268, 2 ♀♀, 1 ♂, ser. no. 276, 4 ♀♀, 1 ?, ser. nos. 277, 278, *undated* (*Herr Schutze per Dr. A. Roman*). D. S. Wilkinson's Collection: Hampshire, Brockenhurst, a card of five (3 ♀♀, 2 ♂♂), 25–30.vi.1933 (*G. Nixon*); Surrey, Westcott, 2 ♀♀, 1 ♂, coll. 3.v.1939, em. 27.v.1939, Riddlesdown, 1 ♀, 1 ♂, coll. 6.v.1939, em. 20.v.1939 (*R. L. E. Ford*); 1 ♀, 20.v.1935 (*W. Fassnidge*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Reinhard Collection, Herrnhuth, 4 ♀♀ (one now the *neotype* of *viminetorum*), 5.vi.1864, mus. ser. no. 26957, 1 ♂, mus. ser. no. 26957, all det. Reinhard as *viminetorum* Wesm. Musée Royal d'Histoire Naturelle, Bruxelles: Wesmael Collection, 4 ♀♀ (one the *type* of *fuliginosus*), 2 ♂♂, 1 ?, mus. ser. no. 2004.

Type of *viminetorum* Wesm., lost; *neotype* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin, mus. ser. no. 26957. *Type* of *fuliginosus* Wesm. in the Wesmael Collection, Musée Royal d'Histoire Naturelle, Bruxelles, mus. ser. no. 2004.

Host. The original description both of *viminetorum* and of *fuliginosus* is without host record. Reinhard's material, from which a neotype has been selected, is recorded by him to have been bred from the Tineids *Elachista airae* Staint., now known as *E. perplexella* Staint., on *Aira caespitosa*, which is now known as *Deschampsia cespitosa* (L.) Beauv., and *Elachista adscitella* Staint., now known as *E. megerlella* Staint.

Of the material from which I have redescribed the species, Schutze's three females numbered 267 and Ford's specimens from Westcott were bred from *Elachista nigrella* Haw., Schutze's three specimens numbered 276 from *E. megerlella* Staint., his five specimens numbered 277 and 278 from *E. bifasciella* Treits., and his five specimens numbered 268 from *E. trapeziella* Staint., Ford's pair from Riddlesdown from *E. albifrontella* Hübn., Fassnidge's single female from *E. cerusella* Hübn., Hering's pair from *E. triatomea* Haw., and Larsen's

series from *E. apicipunctella* Staint. on *Milium effusum*, while Marshall's three specimens were bred, and also recorded, by Bignell from *E. magnificella* Tengst. The remainder of the material before me is without host record.

Records in the literature of hosts I am unable to accept, or at least which I must treat with reserve, are rather numerous. As a host of *viminetorum*, Dours (1874) has recorded the Tineid *Coriscium querquellum*, by which he probably meant *C. quercetellum* Zell., which is now known as *C. brongniardellum* F., Vuillet (1913) the Lymantriid *Euproctis chrysorrhoea* L., Federov (1927) the Zygaenid *Theresia*, now *Theresimima*, *ampelophaga* Bayle in the Crimea, Morley (1936) the Noctuid *Tethea*, now *Ipimorpha*, *subtusa* F., and, as a host of *fuliginosus*, Ratzeburg (1852) has recorded the Tineid *Tinea*, now *Hyponomeuta*, *padella* L., Rondani (1873) the Tortricid *Tortrix laevigana* Schiff., Vollenhoven (1873) the Tineids *Coleophora nigricella* Steph. and *C. otitae* Zell., Brischke (1882) the Tineid *Gracillaria hofmanniella* Schleich, Marshall (1888) the Tineid *Coleophora murinipennella* Dup., Morley (1906) the Sphingid *Hemaris fuciformis* L., the Pterophorid *Platyptilia acanthodactyla* Hübn., and the Hesperiid *Spilothyrus alceae* Esper, now known as *Carcharodus fritillarius* Poda, Faure (1925) the Tineid *Stenolechia*, now *Parachronistis*, *albiceps* Zell., Leonardi (1927) the Tortricid *Cacoecia rosana* L., and the Pterophorid *Platyptilia cosmodactyla* Hübn., Fahringer (1935) the Agrotid *Amphipyra pyramidea* L., and Morley (1936) the Tineid *Epermenia chaerophyllella* Göze. Many of the above hosts have been recorded more than once; but I have only quoted the earliest record known to me, since in the majority, if not all, of the instances it is quite impossible to determine whether the record was or was not merely extracted from literature.

Finally, there are a few records I know for certain to be incorrect. Bridgman (1884), under both *viminetorum* and also *fuliginosus*, and Marshall (1885), record that Fletcher bred *Apanteles* material from the Tineid *Gelechia*, or *Lita*, *instabilella* Doug., which is now placed by us in the genus *Phthorimaea*, and that this material was determined by Fitch as *viminetorum* and *fuliginosus*. I have seen this material in the Fitch Collection, and it is not referable to *viminetorum*. The records, under *fuliginosus*, by Marshall (1885, 1888), Bignell (1887, 1901), and Butterfield & Lyle (1929), and in addition almost certainly those under *viminetorum* by Marshall (*Spéc. Hym. Eur.* **5 bis :** 178) and Billups (1889), of the Tineid *Gracillaria syringella* F., are referable to *Apanteles gracillariae* Wilkn., while the records by Lyle (1917), under *viminetorum*, of the Agrotid *Hylophila*, now *Pseudoips*, *bicolorana* Fuessly, of the Arctiid *Nola cucullatella* L., and of the Geometrid *Hybernia*, now *Theria*, *rupicapraria* Schiff., are referable to *Apanteles lacteicolor* Vier.

Authors whom I have not here previously mentioned and who have also referred to many of these records, either under *viminetorum* or *fuliginosus*, are Boselli (1928), Cecconi (1924), Dalla Torre (1898), Fahringer (1935), Gaulle (1907), Ivanov (1899), Rudow (1917), and Szépligeti (1896).

Cocoons pure white, solitary.

Commentary. Wesmael originally described his *viminetorum* from two females captured by himself " dans une oseraie près de Bruxelles " towards the middle of May. In the Wesmael Collection in Brussels, however, there is no material labelled with this name. Not only is all the remainder of Wesmael's material to be found in the collection, but it is in the collection in exactly the same order in which it was dealt with by Wesmael in his monograph—yet these two females of *viminetorum* are not in their place and neither are there any labels to show whether they had ever been in the collection. The type is lost, therefore.

The first reviser of *viminetorum* Wesm. is Reinhard 1881. This author redescribed Wesmael's species from an unstated number of females bred " aus Minen von *Elachista Airae* an *Aira caespitosa* und aus *Elachista adscitella*." In the Reinhard Collection under this name were four females and one male. This material agrees perfectly with Reinhard's description, and also, which is as important, with Wesmael's original description. Further, one female is labelled " aus minen von *Elachista Airae*. Herrnhuth. 5.6.64. *Aira caespitosa* ", and the male " a. *Elach. adscitella* ". Obviously therefore this material is to be accepted as the series from which a neotype must be selected; and as may be seen above I have selected one female as the neotype, and so labelled it. These five specimens of Reinhard's, which are before me as I write, are obviously conspecific, and agree perfectly and in the minutest detail with all the material from which I have made the redescription of the species.

Wesmael originally described his *fuliginosus* from six females and four males captured by himself in the " environs de Bruxelles " in July and August. In the Wesmael Collection in Brussels standing under this name were four females, two males, and one specimen of unknown sex. This material, which is before me as I write, agrees perfectly with Wesmael's description, and is obviously part of the original series; and I am selecting a female as the type, and so labelling it. This series agrees perfectly and in the minutest detail with all the other material before me from which I have redescribed the species.

It will be observed that Wesmael published the descriptions of his *viminetorum* and *fuliginosus* with only a single page to separate them; but, despite this, I am convinced that, under all the circumstances, I am correct to synonymise these two. It is remarkable how closely the two original descriptions agree with one another, and even more remarkable that Wesmael failed to notice this. He may have noticed, however, at some later date, that he had described the same species under two names, and it is very probable this is the explanation for the absence from his collection of the material under one of the names.

Apanteles laetus Marsh.

Apanteles laetus Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 189–190; 1888, *Spécies Hymen. d'Eur.* **4** : 437–438.

♀. Black; four anterior legs entirely (save only for the black feet and for some slight darkening on the apical tarsal segments), hind trochanters and trochantines, hind femora (save often for a small dark patch at apex above), hind tibiae in basal three-fourths, basal segment of hind tarsus at base, labrum, tegulae, lateral membranous margins of the basal tergites, and the ventrites of at least the basal third of the abdomen, red testaceous; hind coxae red testaceous, with more usually about the basal third black but as much as the basal half and often only the extreme base, rarely if ever entirely without some black at base; hind tarsi otherwise strongly darkened; scape more usually with a large area red testaceous, but often entirely black; palpi and tibial spurs pale; wings infumated evenly throughout, and the setae coloured; stigma discally more or less hyaline, its margins pigmented; costal veins, margins of stigma, and about the basal half of the metacarp more or less, red testaceous; 1st abscissa of radial, transverse cubital, 2nd abscissa of cubital, and about apical half of metacarp more or less, light brown; remaining veins more or less colourless save for pigmentation on the apical portion of 1st abscissa of medial, 2nd abscissa of medial, and the nervulus.

♂. Black; the trochanters, trochantines, tibiae, and tarsi, of the four anterior legs (save for black feet and darkened apical tarsal segment), front femora, hind coxae at extreme apex below commonly, hind trochantines, hind tibiae in basal three-fifths, and basal segment

of hind tarsus at base, red testaceous; four anterior coxae red testaceous at apex or in apical half, occasionally entirely so, and occasionally (especially the middle coxae) entirely black; middle femora very occasionally entirely red testaceous, more usually darkened to a varying extent and strength; hind femora more usually strongly darkened to black, occasionally with some red testaceous colouring on outer faces, or occasionally even entirely red testaceous save for strongly darkened or black apical fourth; hind tarsi otherwise strongly darkened; palpi and tibial spurs pale; wings infumated evenly throughout, and the setae coloured; stigma discally to some extent hyaline, or perhaps more rightly describable as more weakly pigmented discally than on margins; costal veins, margins of stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins very lightly pigmented to colourless.

♀♂. *Head*: clypeus and face throughout with evenly spaced, minute (degree 2) punctation, pruinose in certain lights; facial depressions rather nearer to apex of clypeus than to the eyes; frontal orbits, frons, and vertex, evenly, minutely punctate (degree 1); posterior

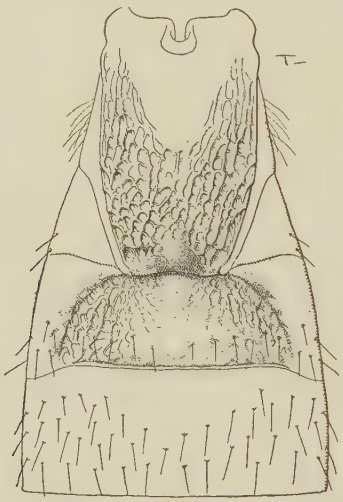

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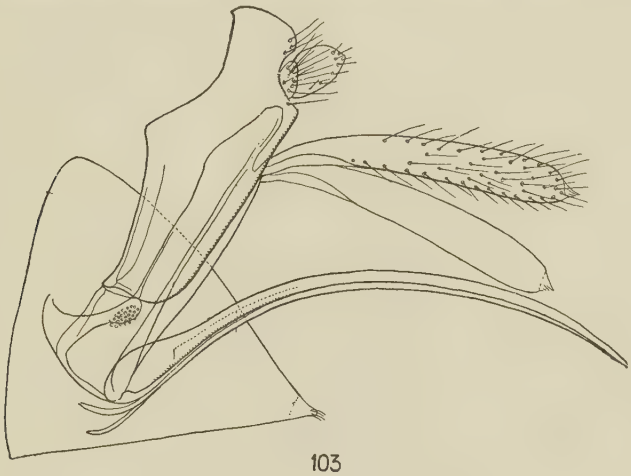
Fig. 102.—*Apanteles laetus* Marshall; basal tergites, ♀.

ocelli rather nearer to each other than to the eyes; flagellum of ♀ much longer than combined length of head, thorax, and abdomen, shorter than combined length of thorax and abdomen together with twice the length of the head, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head, about equal to three times the length of the thorax. *Thorax*: mesonotum and disc of scutellum pruinose throughout, with evenly and rather closely placed, minute punctation (degree 1); non-excavate area of lateral faces of scutellum not reaching up half-way to base of scutellum; propodeon in basal half minutely punctate (degree 1) in each lateral two-fifths, in apical half with some short carinulae radiating from the median apical lunule, otherwise smooth. First abscissa of radial angled with, and about equal to or rather longer than, in the ♂ often noticeably longer than, the transverse cubital; metacarp equal in length to or rather longer than stigma. *Legs*: hind coxae above with well-separated, minute punctation (degree 1), narrowly on outer faces entirely smooth save perhaps for an occasional minute puncture; the longer hind tibial spur half, and the shorter spur rather more than one-third, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 102, 103 and 104): 1st tergite basally excavated, apically turned over, in about basal third (or perhaps rather more) smooth medially with the lateral fourths longitudinally striate or aciculate, the tergite

otherwise rugose, or at least weakly rugose, save for the smooth median apical lunule; 2nd tergite rugose or at least weakly rugose; 1st and 2nd tergites in ♂ almost invariably more weakly sculptured; 3rd tergite across base and apex and in a large median basal triangle, even sometimes broadly across base, smooth, otherwise minutely punctate; succeeding tergites minutely punctate; ♀ with 3rd ventrite with a broad median longitudinal excision throughout basal half, and 4th and 5th ventrites with a short, median excision in about basal fourth, these ventrites otherwise, and the hypopygium, without any sign of a median longitudinal suture, the pigmented portion of the hypopygium exhibiting at apex a short



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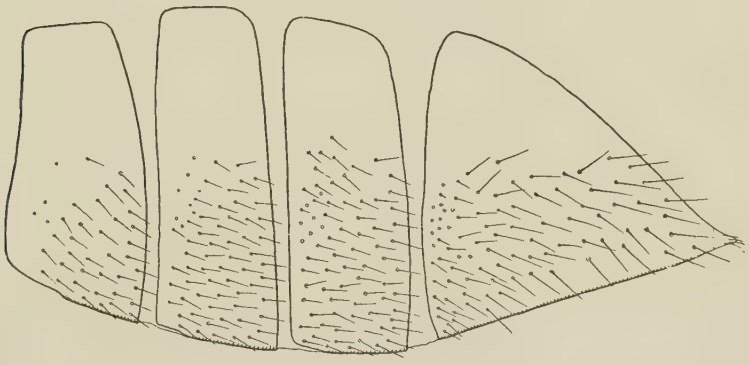

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Figs. 103 & 104.—*Apanteles laetus* Marshall: 103, genitalia, ♀; 104, apical ventrites, ♀.

lower posterior margin, the extreme acute apex more membranous; ovipositor sheaths somewhat longer than basal segment of the hind tarsus, longer than half the length of the hind tibia, about equal to half the total length of the hind tarsus, the ovipositor strongly decurved, equal to combined length of the four basal segments of the hind tarsus.

Length, 2·0–2·75 mm.

Redescribed from the following material:—Essex Field Club: Fitch Collection, 2 ♀♀, 31.vii.1882 (*G. Elisha*); a card of four (4 ♀♀, one now the *type*), 24.vii.1884. D. S. Wilkinson's Collection: England, Surrey, Box Hill, 2 ♀♀, 5 ♂♂, coll. 18.vi.1937, em. 1.vii.1937, 2 ♂♂, coll. 10.vi.1939, em. 5.vii.1939 (*R. L. E. Ford*), 1 ♀, coll. 15.vi.1938, em. 1.vii.1938 (*R. L. E. Ford & D. S.*

Wilkinson), 33 ♀♀, 29 ♂♂, coll. 18.vi.1940, em. 8.vii.1940 (*R. L. E. Ford & B. H. Vawdrey*); England, I.o.W., Yarmouth, 1 ♀, 3 ♂♂, coll. 12.vi.1939, em. 7.vii.1939 (*R. L. E. Ford*).

Type in the Fitch Collection, Essex Field Club.

Host. Marshall originally described eleven of his specimens of his *laetus* as parasites of the Tineid *Gracillaria semifascia* Haw., and the remaining two as parasites of the Tortricid *Eupoecilia*, now *Phalonia, ciliella* Hübn.; and of these, the former was given as the host for the material that was first mentioned and from which material, consequently, I have selected the type. All the material from my collection was bred from the former host, in rolled leaves of maple.

There are very few references to *A. laetus* in literature. Fahringer (1922), having recorded his inability to breed the species from either *G. semifascia* or *P. ciliella*, states that he bred a single male specimen from each of the two following hosts, namely *Gracillaria elongella* L., and the Tineid *Lithocolletis stettinensis* Nic. In his *Opuscula braconologica* (1935), however, he does not mention these two records, but gives another, *Lithocolletis alniella* Zell., a name now synonymised under *L. alnifoliella* Dup. There are no further records, Rudow (1917) and Leonardi (1927) merely giving Marshall's original hosts.

Cocoons solitary, dull pure white, and suspended from both ends in the leaf rolled by the host larva.

Commentary. Marshall originally described his *laetus* " from six females," but stated in his final paragraph that " four specimens were bred by Fitch, July 24th, and seven by Elisha, July 17th, from *Gracilaria semifascia* Haw.; two also by Elisha, July 31st, from *Eupoecilia ciliella* Hüb." In the Fitch Collection, standing under the name *laetus* and labelled *A. laetus* n. sp., was a card of four (4 ♀♀) and two other cards each with a single female. In addition, the card of four was labelled " ex *Gracil. semifasciella*. 24.vii.84 ", and the other two specimens respectively " ex *G. semifascia*. G. Elisha. 31.vii.82 " and " ex *Eup. ciliana*. G. Elisha. 31.vii.82 ". These six specimens, further, agree perfectly with the original description. Consequently, they are clearly Marshall's original material. Since the four specimens dated 24 July were the first to be mentioned, it is from these that a type should be selected; and I am selecting the specimen on the extreme right of the card and marking it as " type." They all agree perfectly and in the minutest detail with all the material before me from which I have redescribed the species.

Apanteles dilectus Hal.

Microgaster dilectus Haliday, 1834, *Ent. Mag.* **2**: 246–247. *Apanteles dilectus* Haliday, Reinhard, 1881, *Deuts. ent. Z.* **25**: 39. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885**: 195; 1888, *Spécies Hymen. d'Eur.* **4**: 446.
Microgaster femoralis Bouché, 1834, *Naturg. Ins.* **1834**: 159 (**syn. n.**).

♀. Rather variable in colour. Black; the four anterior legs (save for their coxae and feet), the trochanters, trochantines, femora, basal half or two-fifths of the tibiae, and tarsi (save for feet and apical segment), of the hind legs, scape, and basal ventrites, red testaceous; scape very commonly much or even sometimes wholly darkened to black; the four anterior femora often darkened or black basally and above, or sometimes even more extensively, and the apical segment of the middle tarsi commonly darkened; hind femora often darkened or black above and below, or even broadly above and below; palpi (save basal segment) and tibial spurs pale; wings slightly infumated evenly throughout, and the setae of fore-wing coloured, of hind-wing apparently colourless; apical two-thirds or three-fourths of stigma, and the radial, transverse cubital, and 2nd abscissa of cubital, with perhaps the metacarp, light brown, the remaining veins testaceous; stigma with a cloud at base.

♂. Black; about apical half of front femora, front tibiae, front tarsi (save for feet), middle femora at apex, about basal half of middle tibiae, middle tarsi (save for apical segment and feet), about basal fourth of hind tibiae, basal third of basal segment of hind tarsi, and sometimes the ventrites, red testaceous; occasionally the hind tarsi and the middle and hind tibiae notably more extensively darkened; palpi (save basal segment) and tibial spurs pale; wings slightly infumated evenly throughout, and the setae of fore-wing and of apical half of hind-wing coloured, of basal half of hind-wing apparently colourless; colour of wings otherwise as in ♀.

♀♂. *Head*: face and clypeus closely punctate (degree 3); facial depressions much nearer to apex of clypeus than to the eyes; frons and frontal orbits minutely punctate (degree 2 or even 1); vertex apparently coriaceous; posterior ocelli nearer to each other than to the eyes; flagellum of ♀ equal to or just a little longer than combined length of thorax and

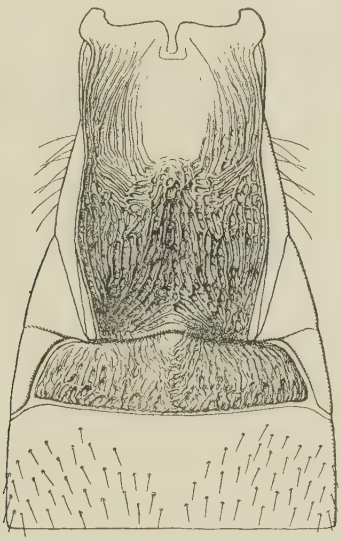

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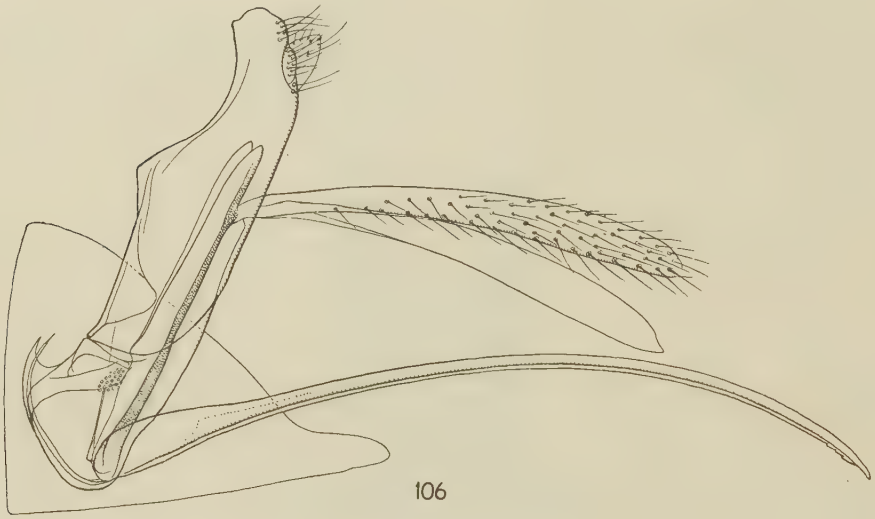
Fig. 105.—*Apanteles dilectus* Haliday; basal tergites, ♀.

abdomen, of ♂ approaching three times the length of the thorax, about equal to combined length of thorax and abdomen together with three times the length of the head. *Thorax*: the lines of the notauli, and a very large posterior area into which they lead, strongly punctate (degree 4), neither of these areas, however, thereby clearly delimitated, the punctures closely placed and shallow, the mesonotum otherwise punctate (degree 3), but entirely smooth narrowly across apex; disc of scutellum closely punctate (degree 3) along the sides and with some few widely placed punctures medially; propodeon in basal half punctate (degrees 3 and 4), save perhaps for a narrow medial area that is depressed and entirely smooth, in apical half with well-marked, depressed areola which is broadly __/-shaped at apex and the lateral margins of which are made up of various carinae, which tend to radiate into the carinulate but otherwise largely smooth apical angles, the propodeon notably more strongly sculptured in the ♀ than in the ♂. *Legs*: hind coxae basally above strongly punctate (degree 4), or in some smaller ♀♀ and in the majority of the ♂♂ more rightly describable as with some strong punctures or merely as punctate, apically above and on outer faces with minute (degrees 2 and 1), well-separated punctation; the hind tibial spurs subequal, the longer spur half the length of the basal segment of the hind tarsus.

Abdomen (figs. 105, 106 and 107): 1st tergite basally excavate and aciculate, medially slightly tumescent, the apical half turned over and rugose and more or less flat save for a shallow, broad, median longitudinal depression, the apical angles slightly depressed, the median apical lunule not in much evidence, the tergite in the ♂ narrower than in ♀ and not so strongly sculptured; 2nd tergite in ♀ with closely placed, longitudinal aciculation throughout and with a transverse row of punctures, in ♂ not so strongly sculptured, even



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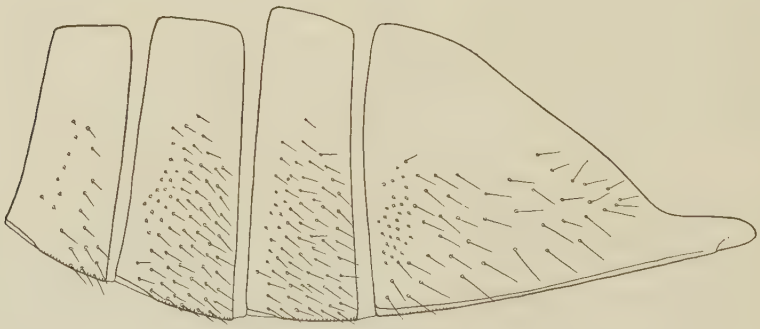

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Figs. 106 & 107.—*Apanteles dilectus* Haliday: 106, genitalia, ♀; 107, apical ventrites, ♀.

largely smooth (save for some punctures), narrower than in ♀ and relatively longer, its median longitudinal length of course less than that of the 3rd tergite but approaching the apical breadth of the 1st; 3rd tergite smooth across base and apex and in a median basal triangle, otherwise minutely punctate; succeeding tergites minutely punctate; 3rd, 4th, and 5th ventrites of ♀ apparently with broad median longitudinal suturing throughout their basal fourth or third, otherwise definitely without median longitudinal suture; hypopygium more or less broadly membranous throughout the median line, and its apex

membranously acute; ovipositor sheaths equal in length to the hind tibia, the ovipositor longer than the hind tarsus, rather longer than combined length of hind tibia and the two basal segments of the hind tarsus.

Length, 2·0–2·75 mm.

Redescribed from the following material :—British Museum : Marshall Collection, 2 ♀♀, det. *dilectus* Hal.; Lyle Collection, Cambridge, 1 ♀, 19.vii.1917, ser. no. 3303, 1 ♂, 10.vii.1917, ser. no. 3249, 1 ♀, 12.vii.1917, ser. no. 3250, 1 ♀, 1 ♂, 15.vii.1917, ser. nos. 3267, 3269, all det. Lyle as *dilectus* Hal. Essex Field Club : Fitch Collection, 1 ♀ (Bignell, 1875), det. *dilectus* Hal. Imperial Forestry Institute : Reddings Enc., Forest of Dean, Glos., three cards of two (3 ♀♀, 3 ♂♂), coll. 17.vi.1933, em. 30.vi.1933 (*J. M. Brown*), det. *dilectus* Hal. Ministry of Agriculture, Harpenden : Harpenden, Herts, 2 ♀♀, July 1933 (*C.T.G.*). Naturhistorisches Museum, Wien : Bozen, 2 ♀♀, 4 ♂♂, *undated*, det. Reinhard as *emarginatus* Nees; Austria inf., 1 ♂, no. 10, 1879 (*Rogenhofer*), det. Reinhard as *impurus* Nees. Bundesanstalt für Pflanzenschutz, Wien : 3 ♀♀, 9.viii.1910, det. *dilectus* Hal. A. C. W. Wagner's Collection : Hamburg, 1 ♀, det. Schmiedeknecht as *dilectus* Hal. D. S. Wilkinson's Collection : England, Harpenden, Herts, 43 ♀♀, 54 ♂♂, coll. 21.vi.1937, em. 2.vii.1937, Bexley, Kent, 27 ♀♀, 10 ♂♂, pup. 21.vi.1937, em. 28.vi.1937 (*R. L. E. Ford*), Eastbourne, Sussex, 7 ♀♀, 6 ♂♂, 17.vii.1938 (*S. N. A. Jacobs*), St. Chads, Yeovil, Somerset, 45 ♀♀, 47 ♂♂, and 2 ♀♀, 9 ♂♂, coll. 22.vi.1937, em. 3.vii.1937 (*D. S. Wilkinson*).

Further material examined :—Reinhard Collection, 5 ♀♀ (one now the *neotype* of *dilectus*), det. *dilectus* Hal. Bouché Collection, 1 ♀ *type* of *femoralis*. Cambridge University Museum : New Forest, 1 ♀, vi.1902 (*D. Sharp*).

Type of *dilectus* Hal., lost; *neotype* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin, mus. ser. no. 26948. *Type* of *femoralis* Bouché in the Bouché Collection, Zoologisches Museum der Universität, Berlin, mus. ser. no. 13115.

Host. The original description of *dilectus* is without host record; and *femoralis* was originally described as a parasite of the Agrotid *Mamestra persicariae* L., a record of which I have no confirmation. The first reviser of *dilectus*, namely Reinhard, whom I have accepted, redescribed the species " aus Wicklern an *Syringa vulgaris* erzogen "; and of the material from which I have redescribed the species, Lyle's five specimens, Gimingham's two females from Harpenden, and my long series from Yeovil, are recorded from the Tineid *Gracillaria syringella* F. on lilac, while the series taken by Ford from Harpenden is recorded from this host on privet and lilac, my short series from Yeovil from the same host on privet only, the six specimens from the Forest of Dean from this same host on ash, and Marshall's two females, Fitch's single female, the six specimens from Bozen, the three females from the Bundesanstalt für Pflanzenschutz, the series from Bexley, and Jacob's series from Eastbourne, simply from *G. syringella* without mention of the host-plant. Finally, Rogenhofer's male is recorded from *Gracillaria elongella* L., and Wagner's single female appears to be without host record.

Reinhard in his redescription also states, as a second record, that Kriechbaumer bred a female of this species from a species of *Coleophora*; a record, I think, that can be ignored.

There are records in the literature of *G. syringella* as a host of *dilectus* by Bignell (1901), Niezabitowski (1910), and Ruschka & Fulmek (1915). Records

in the literature I do not intend to accept are those by Brischke (1882) and Meier (1927) of the Lymantriid *Leucoma salicis* L., and by Telenga (1935) of the Tineid *Coleophora fuscidinella* Z. I think, also, that Bignell's record (1901) of the Tineid *Prays curtisellus* Don. must be treated with reserve.

Cocoons white, solitary, found inside the curled leaf.

Commentary. Haliday originally described his *dilectus* from an unstated number of females only, from his own collection, since he mentioned no other, as was his habit when describing some material from some collection other than his own, and from material that had not been bred, since he gave the habitat simply as "*in Salice rarius.*" In the remains of the Haliday Collection in the Dublin Museum there is no material labelled with this name. The type is lost, therefore.

The first reviser of *dilectus* Hal. is Reinhard 1881. This author redescribed Haliday's species from an unstated number of females bred "aus Wicklern an *Syringa vulgaris*," adding also that Kriechbaumer obtained a single female from a species of *Coleophora*. In the Reinhard Collection, under the name *dilectus*, are five females labelled "Wickler v Syringa vulgaris", and with the serial number 26948. This material agrees perfectly with Reinhard's description, and also, which is as important, with Haliday's original description, and is quite obviously to be accepted as the series from which a neotype must be selected; and, as may be seen above, I am selecting one specimen as the neotype and so labelling it. This series of Reinhard's agrees perfectly and in the minutest detail with all the other material before me of this species, as was to be expected in view of its host; Reinhard's second record of a species of *Coleophora* as a host may be ignored.

Bouché originally described his *femoralis* from an unstated number of specimens of apparently the female sex only, and as a parasite of "*Noctua persicariae.*" In the Bouché Collection is a single female labelled in the usual manner for this collection with four labels—"Berlin"; the serial number 13115; a red "type" label; and the usual Stein label, "*femoralis* Bouch.*." There is no Enderlein label. This specimen agrees sufficiently with Bouché's original description, such as it is, and I am convinced that Stein was correct to accept it as the type of the species. It agrees in the minutest detail with the darker material from which I have redescribed Haliday's species, despite the hosts being so widely separated. One is inclined to wonder if the host record of *femoralis* is correct.

Nees sunk *femoralis* under his *circumscriptus*; but the original descriptions of these two cannot be made to agree. It is also interesting to note that neither Reinhard nor Marshall was able apparently to recognise *femoralis*.

Apanteles mesoxanthus Rus.

Apanteles mesoxanthus Ruschka, *in* Kemner, 1917, *Medd. Centralanst. Försöks. jordbr. Stockholm*, no. **161** (Ent. avd., no. 28) : 25.

♀. Black; the four anterior legs (save for the black coxae and feet), hind trochantines, hind femora, hind tibiae in about basal three-fifths, and the segments of the hind tarsi basally, red testaceous; hind tibiae and tarsi otherwise darkened; hind femora commonly much darkened basally below, and along (or throughout) the upper margin; middle femora often with some slight darkening at extreme base; palpi and tibial spurs pale; wings hyaline, the setae of at least the fore-wing coloured; costal veins red testaceous; metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins more or less colourless; stigma brown or even light brown, and with a large cloud

basally and occasionally with some indication of a small cloud at apex; in some few examples the basal cloud is small.

♂. Black; the fore-legs (save for the black coxae and feet), middle trochantines, middle femora (save in basal half, and above and below, or even more extensively), middle tibiae largely, middle tarsi (save for the feet), commonly certain portions of the hind trochantines, often a small spot at extreme base below of hind femora, about basal half or two-fifths of hind tibiae, and the segments of the hind tarsi basally, red testaceous; hind tarsi otherwise darkened; hind femora occasionally with some other slight traces of red testaceous; palpi and tibial spurs pale; wings as in ♀.

♀♂. *Head*: face and clypeus throughout with closely placed, minute, shallow punctation; facial depressions remote from the eyes, virtually reaching apex of clypeus, rather

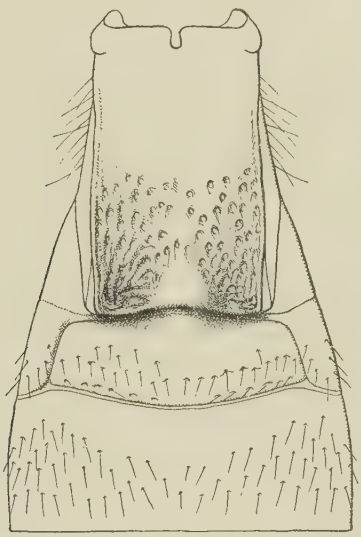

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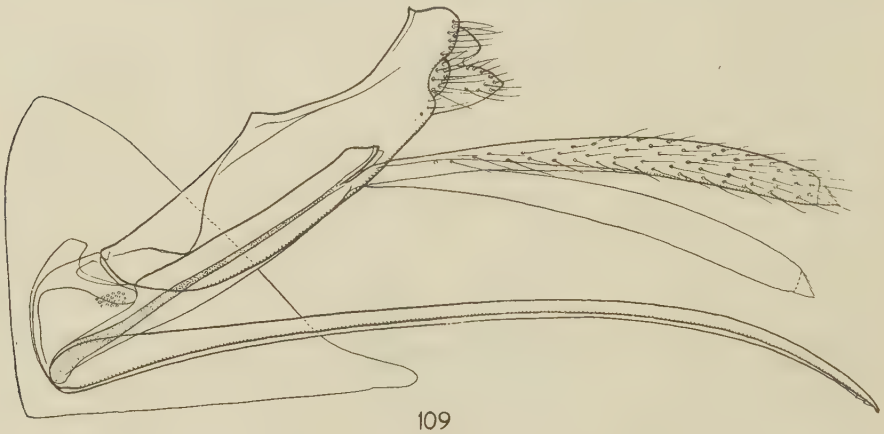
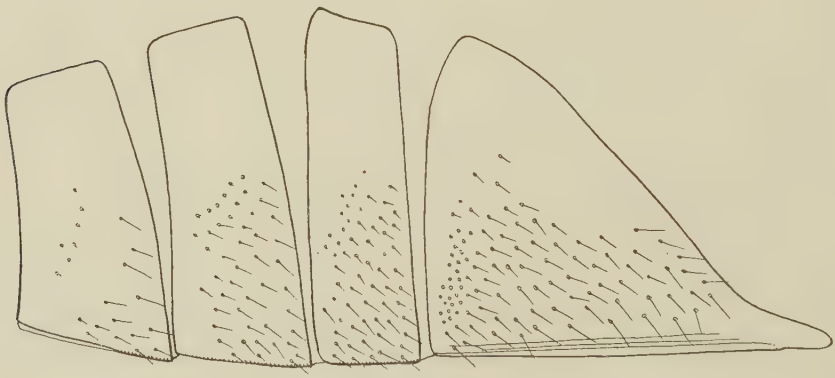
Fig. 108.—*Apanteles mesoxanthus* Ruschka; basal tergites, ♀.

elongate, their length greater than their distance from apex of clypeus; frontal orbits, frons, and vertex, throughout with minute, shallow punctation (degree 2); posterior ocelli of ♀ just nearer to each other than to the eyes, of ♂ equidistant from each other and the eyes; flagellum of ♀ longer than combined length of head, thorax, and abdomen, just shorter than combined length of thorax and abdomen together with twice the length of the head, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head. *Thorax*: mesonotum throughout with regularly and rather closely placed punctation (degrees 2 and 3). entirely smooth narrowly across extreme apex; disc of scutellum minutely punctate (degree 1) down the sides and often with some few minute punctures discally, otherwise entirely smooth and highly polished; propodeon in the basal half punctate (degrees 3 or even 4), save medially where it is much smoother (or even entirely smooth) and slightly impressed, the areola __/-shaped at apex and with some sculpture, the apical angles smooth save for some striation. *Legs*: hind coxae basally above save for some few rather strong (degree 3 and 4) punctures, apically above save for some well-separated minute (degree 1) punctures, and on outer faces above save for some few widely scattered minute (degree 1) punctures, entirely smooth and highly polished; hind tibial spurs subequal, the longer spur half the length of the basal segment of the hind tarsus.

Abdomen (figs. 108, 109 and 110): 1st tergite basally excavate and with some aciculation at sides, medianly with an aciculate or entirely smooth tumescence, or even thus quite strongly tumescent, apically turned over, the apical half smooth save for some aciculation, which is not always noticeable, and save for numerous, strong (degree 4), well or even widely separated punctures, which occur in the basal half or basal two-thirds of the apical half, the apex emarginate, and the apical angles depressed and aciculate; 2nd tergite entirely smooth save for some aciculation, which is not always noticeable and which is often absent,



109



110

FIGS. 109 & 110.—*Apanteles mesoxanthus* Ruschka: 109, genitalia, ♀; 110, apical ventrites, ♀.

and save for one or two transverse rows of punctures (degree 3) across the apical half, or, especially in the ♂, save for irregular punctation in the apical half; 3rd tergite entirely smooth narrowly across apex and in a broad, broadly rounded area in basal half, otherwise minutely punctate; succeeding tergites minutely punctate; 2nd, 4th, and 5th ventrites of ♀ with median longitudinal suture; 3rd ventrite apparently with narrow, median longitudinal excavation throughout the basal five-ninths or two-thirds, the apical four-ninths or one-third definitely without either median longitudinal excavation or suture; hypopygium more or less broadly membranous throughout the median line, and its apex membranously

acute; ovipositor sheaths rather shorter than combined length of the three basal segments of the hind tarsus, the ovipositor longer than the hind tarsus, rather longer than combined length of hind tibia and basal segment of the hind tarsus.

Length, 2·25–3·0 mm.

Redescribed from the following material :—Oxford University Museum : Oxford District, 1 ♂, v.1924, bred 27.vi.1924 (*E. G. R. Waters*). O. W. Richards's Collection : England, Bucks, Slough, 1 ♀, 37171, em. 16.vii.1935 (*O. W. Richards*), 4 ♀♀, 37135, 37285, 37287, 37288, 14, 17, and 22.vii.1935 (—. *Jaywickreme per O. W. Richards*), Ullswater, Westmorland, 3 ♀♀, 2 ♂♂, 40305, 40432, 40773, 40774, 40789, 24.vi.1936, em. 17, 21, 31.vii.1936 and 1.viii.1936. D. S. Wilkinson's Collection : England, Essex, Hadleigh, 1 ♀, 16.vii.1936; England, Cumberland, Ullswater, 141 ♀♀, 125 ♂♂, coll. 15.vi.1937, em. 4.vii.1937, Sussex, Staplecross, 1 ♀, 2 ♂♂, coll. 28.iv.1937, em. 7.vii.1937 (*D. S. Wilkinson*), Kent, Bexley, 1 ♂, coll. 28.iv.1937, em. 19.viii.1937, 1 ♀, 1 ♂, coll. 2.v.1937, em. 8.viii.1937, Wilmington, 1 ♀, 5 ♂♂, coll. 7.iv.1938, em. 5.vii.1938, Cambridge, 2 ♀♀, 3 ♂♂, coll. 8.vi.1937, em. 6.vii.1937 (*R. L. E. Ford*), Sussex, Balcombe, 3 ♂♂, 22.vi.1937 (*H. M. Edelsten*), Scotland, Edinburgh, 2 ♀♀, 3 ♂♂, coll. 14.vi.1937, em. 9.vii.1937 (*R. de Glanville*).

Further material examined :—Statens Växtskyddsanstalt, Stockholm : Luleå, 1 ♀ (*type*), 18.vii.1916 (*N. A. Kemner*).

Type in the Statens Växtskyddsanstalt, Stockholm.

Host. Ruschka originally described his *mesoxanthus* as a parasite of the Tineid, *Coleophora fuscedinella* Zell., and, of the material from which I have now redescribed the species, the two series from Ullswater and the series from Staplecross, Balcombe, and Edinburgh, were bred from this host on alder, the pair from Bexley and the series from Cambridge from this host on elm, and the single male from Bexley from this host on birch. Of the remainder of the material, the single male from Oxford is labelled to have been bred from *Coleophora gryphipennella* Bouché, on wild rose, Richards's single female no. 37171 from *C. anatipennella* Hübn., on plum, the series from Wilmington from this latter host also, but without plant record, the four females bred by Jayewickreme from *C. betulella* Hein., on birch, and the single female from Hadleigh from *C. lutipennella* Zell., on oak.

In the literature there would seem to be no records of this species of *Apanteles*.

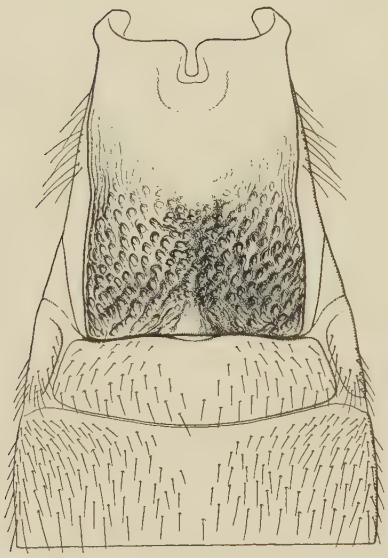
Cocoons. The parasite pupates inside the case of its host.

Commentary. Ruschka originally described his *mesoxanthus* from an unstated number of apparently females only, stating that the types were in the collection of the Entomological Department of the Centralanstalt des Landwirtschaftlichen Versuchswesens, Experimentalfältet, Sweden. The description was published in a paper on *Coleophora fuscedinella* by Kemner, who records therein that this *Apanteles* was bred from this host, and who states, further, that a single example of the parasite from " Luleå in Norbottens län " served as Dr. Ruschka's type. In the Statens Växtskyddsanstalt, Stockholm, in a bottle of spirit, was a single female labelled Luleå, 18.vii.1916 (*N. A. Kemner*), ex *Coleophora fuscedinella*, and with Ruschka's determination label reading " *Apanteles mesoxanthus* cotyp." This specimen agrees perfectly with Ruschka's original description, so far as it goes, and is quite obviously to be accepted as the type, and I have so labelled it. It agrees perfectly and in the minutest detail with all the other material before me of this species, as was to be expected in view of its host.

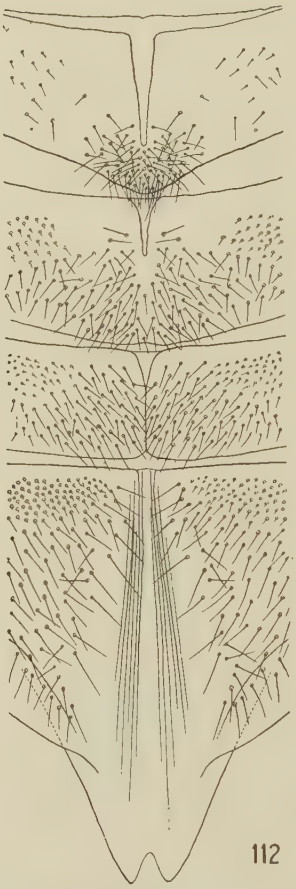
Apanteles praetor Marsh.

Apanteles praetor Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 197; 1888, *Spécies Hymen. d'Eur.* **4** : 453–454. Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 673. Lyle, 1917, *Entomologist* **50** : 51–52. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49** : 409.

♀. Black; apical two-thirds or three-fourths of the front femora, the front tibiae and tarsi wholly (save for the black feet), apical third or fourth of the middle femora, the middle and hind tibiae basally, red testaceous; tibial spurs pale to red testaceous; the four posterior tibiae are increasingly strongly darkened as the apex is approached, the apical



111



112

Figs. 111 & 112.—*Apanteles praetor* Marshall : 111, basal tergites, ♀; 112, apical ventrites (ventral), ♀.

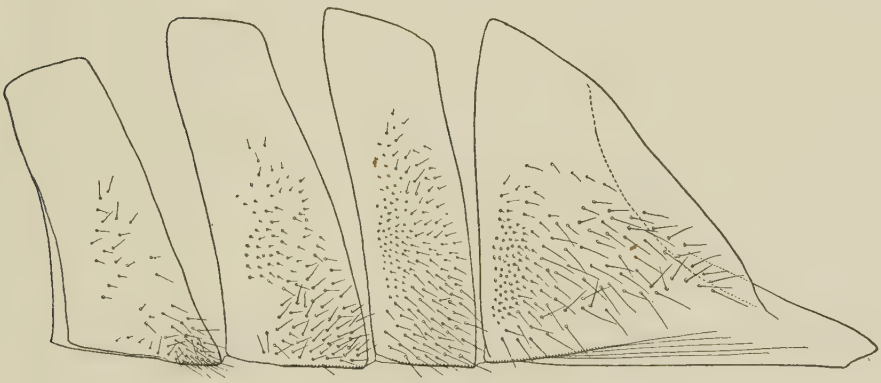
third or fourth of the middle tibiae quite strongly darkened, as are the middle tarsi throughout, while quite the apical half of the hind tibiae is black, as are the hind tarsi throughout; palpi strongly darkened to black; wings strongly infumated, the setae coloured; stigma, metacarp, and certain portions of the costal veins and of one or two other veins, black, the remaining veins strongly pigmented; stigma not uniformly opaque, a cloud occupying most of the basal fourth.

♂. Black; about apical half of the front femora, the front tibiae and tarsi wholly (save

for the black feet), middle femora sometimes at extreme apex, middle and hind tibiae at base, red testaceous; tibial spurs pale to red testaceous; palpi strongly darkened to black; wings as in ♀.

♀♂. *Head*: face and clypeus closely punctate (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frontal orbits punctate (degree 2); frons and vertex minutely punctate; posterior ocelli equidistant from each other and the eyes; flagellum

113



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FIGS. 113 & 114.—*Apanteles praetor* Marshall: 113, genitalia, ♀; 114, apical ventrites, ♀.

of ♀ just a little shorter than combined length of thorax and abdomen, of ♂ about equal to or perhaps rather shorter than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout regularly punctate (degree 2 or perhaps sometimes 3); at apex of mesonotum there is an entirely smooth and highly shining area which is more usually larger in the ♂ than in the ♀, and which is more or less of an equilateral triangle in shape, one side of the triangle being at the scutellar sulcus; in a few examples the mesonotum is additionally entirely smooth narrowly along the medial

line of quite the apical half; disc of scutellum throughout punctate (degrees 2 and 1); the non-excavate area of the lateral faces of the scutellum large, reaching up beyond half-way to base of scutellum; propodeon in basal half strongly (degree 4), closely punctate, almost rugoso-punctate, but the punctures just separated and shallow, medianly in the basal half flattened or even slightly excavate, in the apical half the propodeon deeply excised and with numerous strong rugae immediately in front of, and round, the median apical lunule. *Legs*: hind coxae basally above quite strongly punctate (degree 3 and sometimes 4), apically above and on outer faces with minute and rather widely separated punctation; hind tibial spurs subequal, the shorter spur half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 111, 112, 113 and 114): 1st tergite in basal half excavate, and more or less entirely smooth save in some more strongly sculptured examples where there is much circular aciculation, medianly with a slight tumescence, apically weakly turned over, in apical half very flat, or even slightly hollowed, and throughout with ill-defined, shallow punctation (degrees 3 and 4); both 2nd and 3rd tergites throughout minutely punctate save for a large median basal triangular area that is smooth, the tergites otherwise smooth; succeeding tergites with the usual minute punctation; 2nd ventrite with median longitudinal suture throughout; 3rd ventrite with median longitudinal suture, or elongate rudimentary excision, throughout about basal two-thirds, in the apical third medially with a large group of setiferous punctures; 4th ventrite with median longitudinal suture, or elongate rudimentary excision, throughout basal half only; 5th ventrite basally excised, otherwise with median longitudinal suture throughout; hypopygium membranous broadly throughout the median line, and its apex membranously acute; ovipositor sheaths longer than the basal joint, but shorter than combined length of the basal and 2nd joint, of the hind tarsus, the ovipositor equal to or rather longer than the hind tarsus.

Length, 3·5–4·0 mm.

Redescribed from the following material:—British Museum: Marshall Collection, 1 ♂, Bignell ser. no. 1912; Lyle Collection, Gog Magogs, 3 ♂♂, 15.vii.1917, ser. nos. 3280, 3281, 3283, 3 ♀♀, 1 ♂, 5.viii.1917, 10.viii.1917, 12.viii.1917, ser. nos. 3330, 3340, 3342, 3348, 1 ♂, 21.vii.1918, ser. no. 3676, 1 ♀, 18.viii.1914 [? in error for 1918], ser. no. 3761, all det. Lyle as *praetor* Marsh. Bignell Collection: 1 ♂, Bignell ser. no. 1907. Harwood Collection: Stanway, 1 ♂, vii.1914, Colford, 2 ♀♀, 17.viii.1914. D. S. Wilkinson's Collection: England, Cambridge, Gog and Magog Hills, 21 ♀♀, 9 ♂♂, swept 27–29.vii.1937 (*R. L. E. Ford*).

Type in the British Museum.

Host unknown.

Cocoons unknown.

Commentary. Marshall originally described this species "from two males taken by Bignell in S. Devon; and one female bred by Elisha, Sept. 4th, from *Catoptria aemulana* Schl."; while Bignell records that he captured his material in Oreston Quarry, 1 Aug. 1884. The single male in the Marshall Collection, which was standing here under the name *praetor* and was labelled with a typical Marshall label, bears in addition a quite typical Bignell serial label, no. 1912; and this number shows, in Bignell's register, that the specimen had been captured on 1 Aug. 1884, in Oreston Quarry. This specimen already bore a type label, and it is quite obvious it is this specimen that is to be accepted as the type of the species; and I have so labelled it. The single male in the Bignell Collection bears the Bignell serial number 1907. This shows from the register that this specimen is the other male to which both Marshall and Bignell refer. Hodgson took this male to be the type, probably since he was not aware of the Marshall specimen; but despite this and despite its slight, very slight, priority

I am of the opinion it should not be so considered, but rather that the specimen in Marshall's own collection should be taken as the type, as I have stated. Both these two males agree perfectly and in the minutest detail with all the material before me.

The female bred by Elisha and referred to by Marshall is in Fitch's collection; and is before me as I write. Although quite distinct from *praetor*, it is in many respects remarkably similar; and I am not surprised that Marshall, with his very limited amount of material, should have associated together these three specimens. But despite Marshall's description agreeing perfectly with this female, and not with the real females of *praetor*, I cannot take Elisha's specimen as the type of Marshall's *praetor* instead of the Bignell males, since these latter were mentioned first by Marshall in his description; and this is fortunate.

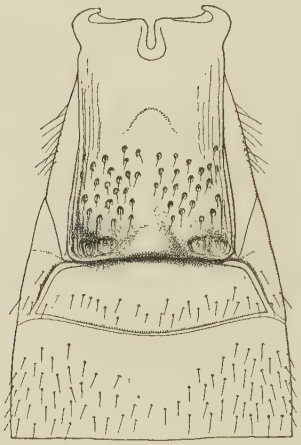
Apanteles laevigatus Ratz.

Microgaster laevigatus Ratzeburg, 1848, *Ichn. d. Forstins.* **2** : 50; 1852, *Ichn. d. Forstins.* **3** : 51.
Microgaster hoplites Ratzeburg, 1848, *Ichn. d. Forstins.* **2** : 50; 1852, *Ichn. d. Forstins.* **3** : 51.
Apanteles hoplites Ratzeburg, Reinhard, 1881, *Deuts. ent. Z.* **25** : 37–38. Bridgman, 1889, *Ent. mon. Mag.* **25** : 282.

♀. Black; four anterior coxae at apex or in apical third, the four anterior legs otherwise entirely (save for the black feet), hind femora, hind tibiae (save for darkened or black apex or apical fifth), base of basal segment of hind tarsus, palpi, and tegulae, red testaceous; the hind trochanters and trochantines darkened to a varying extent and strength; hind tarsi darkened or black; middle and hind femora commonly marked narrowly with black at the base above, much more rarely black at base below and narrowly black all along the upper margin, very rarely extensively black at base below and broadly black all along upper margin; tibial spurs pale; wings hyaline, or perhaps very slightly infumated evenly throughout, and the setae coloured; costal veins red testaceous; metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown, the remaining veins more or less colourless; stigma brown, and with a large cloud basally.

♂. Black; four anterior coxae at apex, the front legs otherwise entirely (save for the black feet and for an occasional small black area on femora at base below), middle trochanters and trochantines, middle tibiae (save in apical third above), hind tibiae in about basal half, and tegulae, red testaceous; hind trochanters and trochantines, and tarsi of four posterior legs, darkened; middle femora black at base below and all along upper margin, otherwise red testaceous; hind femora extensively black at base below and broadly black all along upper margin, otherwise red testaceous, in one or two examples entirely black save for apex below; palpi and tibial spurs pale; wings hyaline, or perhaps very slightly infumated evenly throughout, and the setae coloured; costal veins in part testaceous, in part brown; metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown, the remaining veins more or less colourless; stigma brown, and with a cloud basally.

♀♂. *Head*: clypeus and face throughout with closely placed, minute punctation (degrees 1 or 2); facial depressions much nearer to apex of clypeus than to the eyes; frontal orbits, frons, and vertex, throughout minutely and rather closely punctate; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ longer than combined length of thorax and abdomen, but shorter than combined length of head, thorax, and abdomen, of ♂ somewhat longer than combined length of thorax and abdomen together with three times the length of the head, approaching three times the length of the thorax. *Thorax*: mesonotum throughout with rather closely placed, minute punctation (degree 2), entirely smooth in a small area on extreme apex; disc of scutellum across the base and along the sides with well-separated, minute punctation, medially entirely smooth and highly polished; non-excavate area of lateral faces of scutellum reaching up half-way to base of scutellum; propodeon in basal half punctate (degree 3 in larger specimens) on each side of a narrow, more or less



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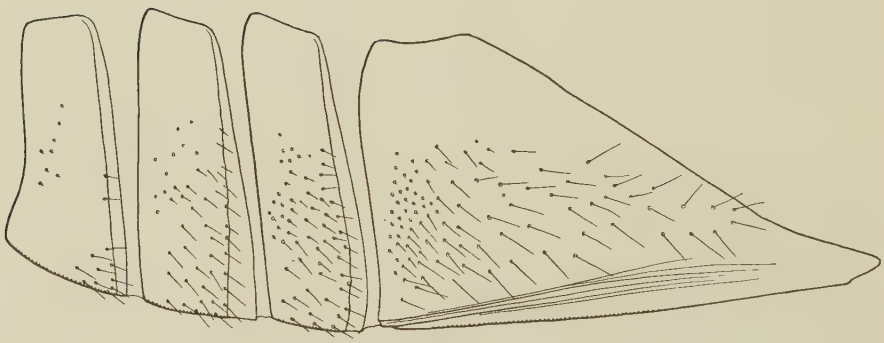

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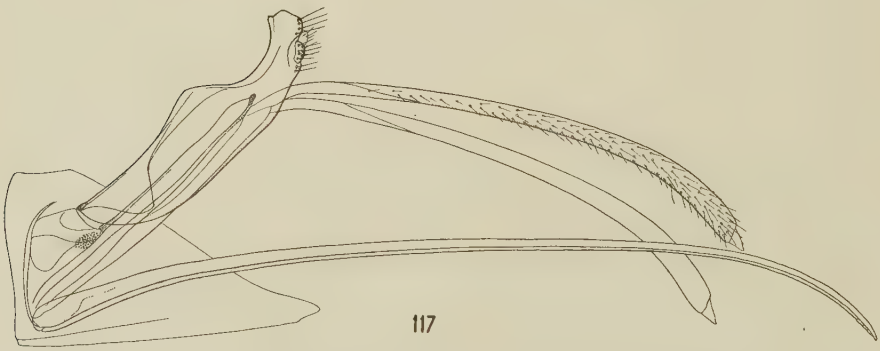

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Figs. 115 & 116.—*Apanteles laevigatus* Ratzeburg : 115, basal tergites, ♀; 116, apical ventrites, ♀.

Fig. 117.—*Apanteles laevigatus* Ratzeburg; genitalia, ♀.

entirely smooth, median area, in apical half with a more or less rugulose areola delimited by various short carinulae rising from the median apical lunule. *Legs*: hind coxae in ♀ basally above punctate (degree 3 or even 4), apically above minutely punctate, on outer faces with well- or even widely separated minute punctation, in ♂ throughout with regular, minute punctation; hind tibial spurs equal, less than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 115, 116 and 117): 1st tergite basally excavate, medianly strongly tumescent in ♀ and weakly so in ♂, apically turned over, in apical half on the sides punctate and medianly with a more or less smooth, somewhat impressed, longitudinal area, noticeably more strongly punctate in ♀ (degrees 3 and 4) than in ♂ (degrees 2 and 3), the apical angles somewhat depressed and aciculate, the lateral margins of the tergite commonly aciculate throughout, and the median apical lunule not strongly in evidence, the tergite in the ♂ narrower than in ♀; 2nd tergite in ♀ more usually with a single row of minute punctures across apical third, in ♂ more extensively punctate; 3rd tergite smooth broadly across base and in a broad median basal triangle, and more narrowly across apex, otherwise minutely punctate; succeeding tergites minutely punctate; 2nd–5th ventrites of ♀ with median longitudinal suture; hypopygium of ♀ broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths longer than hind tarsus, rather longer than combined length of hind tibia and basal segment of hind tarsus, the ovipositor elongate, longer than twice the length of the hind tarsus, about equal to combined length of hind femur and hind tibia together with the three basal segments of hind tarsus.

Length: ♀, 3·0 mm., ♂, 2·5–3·0 mm.

Redescribed from the following material:—Forstliche Hochschule, Eberswalde: Ratzeburg Collection, 2 ♂♂, nos. 389 and 473, det. *laevigatus* Ratz., 1 ♀, 2 ♂♂, no. 3.45, and 1 ♀, det. *hoplites* Ratz. Zoologisches Museum der Universität, Berlin: Reinhard Collection, 1 ♂, no. 390, det. Ratzeburg as *laevigatus* Ratz. (*type* of *laevigatus*), 1 ♀, no. 3.45, det. Ratzeburg as *hoplites* Ratz. (*type* of *hoplites*), and 1 ♀. Norwich Castle Museum: Bridgman Collection. D. S. Wilkinson's Collection: Sussex, Polegate, 2 ♀♀, 9 ♂♂, coll. 12.vi.1939, em. 23.vi.1939, Bexhill, 3 ♀♀, coll. 12.vi.1939, pup. 18.vi.1939, em. 29.vi.1939, Kent, Sandhurst, 2 ♀♀, 2 ♂♂, coll. 13.vi.1939, em. 27.vi.1939, Newenden, 7 ♀♀, 21 ♂♂, coll. 13.vi.1939, em. 30.vi.1939, Paddock Wood, 1 ♀, 1 ♂, coll. 22.vi.1939, em. 30.vi.1939, Tenterden, 7 ♀♀, 3 ♂♂, coll. 23.vi.1939, em. 3.vii.1939 (*D.S.W. & O.P.*); Kent, Bexley, 9 ♀♀, 1 ♂, coll. 6.vi.1939, em. 1.vii.1939, 10 ♀♀, 4 ♂♂, coll. 8.vi.1939, pup. 21.vi.1939, em. 30.vi.1939, Edenbridge, 1 ♀, 7 ♂♂, coll. 24.vi.1939, em. 30.vi.1939, Sussex, Seaford, 6 ♀♀, 1 ♂, coll. 25.vi.1939, em. 4.vii.1939 (*R. L. E. Ford*).

Type of *laevigatus* Ratz., and of *hoplites* Ratz., in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26944.

Host. Ratzeburg originally described his material of his *hoplites* as a parasite of the Tineid *Tinea*, now *Anacampsis*, *populella* Clerck, and from this host was bred all the material from which I have redescribed the species. Ratzeburg originally described the single male example of his *laevigatus* to have been bred by Reissig from the Curculionid beetle *Rhynchites betuleti* F., now known as *Byctiscus betulae* L., "in Aspenrollen." I am convinced, however, that this latter record is incorrect, and that the host was again *A. populella*. This Tineid is to be found both on poplar and aspen, rolling the leaves.

In the literature there are, curiously enough, various other beetle host records, but I am prepared to accept none of them. Ratzeburg (1852) records, under *hoplites*, the Chrysomelid *Chrysomela tremulae* F., on the authority, again, of Reissig, Rondani (1873) *Chrysomela*, now *Chrysolina*, *graminis* L., and Ivanow (1899), Picard (1922), and Suire (1933), the Cerambycid *Compsidia*,

now *Saperda, populnea* L. in galls on poplar, while Fahringer (1935) records doubtfully the Curculionid *Anthonomus varians* Payk. and the Lyctid *Lyctus linearis* Gze. In addition to records of Coleoptera there are also others I cannot accept. Tcherbadzhiev's record (1933) of the Tenthredinid *Hoplocampa fulvicornis* Klug, now *H. minuta* Christ., must surely be wrong, and Marshall (1888) quoted no authority and referred to no material when he gave the Tineid *Gelechia pinguinella* Treits. Under *laevigatus*, Rondani gives the Pterophorid *Pterophorus*, now *Adaina, microdactyla* Hübn. Finally, it is, I think, now admitted that Suire (1926, 1933), Picard (1926), and Paddock (1933), were in error when they recorded the Pyralid *Galleria mellonella* L., as a host of *hoplites*.

Berlese (1924), Billups (1889), Boselli (1928), Brischke (1882), Elliot & Morley (1907), Feytaud (1918), Goureau (1867), Kaltenbach (1874), Leonardi (1927), Mayet (1890), Melis (1936), Morley (1936), Rondani (1873), Rühl (1924), Taschenberg (1879), and Telenga (1935), have also referred to one or other of these records or hosts.

Cocoons solitary, white, papyraceous.

Commentary. Ratzeburg originally described his *laevigatus*, in the second volume of his work, from a single male bred by Reissig on 8 July from some species of insect inhabiting aspen rolls. In the Ratzeburg Collection standing under this name under a scribbled label, as was to be expected since the species was described in the second volume of his work, were two males. These two specimens each simply bear a typical Reissig serial number, 389, and 473, respectively; and they are conspecific and agree perfectly with Ratzeburg's description, such as it is. Despite this, nevertheless, I am unable to accept either one as the type of the species, if only because of Reinhard's statement in 1881. When writing on *hoplites* in 1881 Reinhard stated that " die vorliegenden Original-Expl. aus Ratzeburg's und Brischke's Sammlung " showed that this species and *laevigatus* were identical; and in the Reinhard Collection, under *hoplites*, were three specimens. Of these, a male, and the only male, is labelled in Ratzeburg's unmistakable scribbled writing " *laevigat.* R." and with the Reissig serial number 390. This specimen agrees perfectly with Ratzeburg's original description and with the two males in his collection I have mentioned above, and should in my opinion be accepted as the type, which almost undoubtedly it is; and I am so labelling it.

The name *laevigatus* has priority over the name *hoplites*, and must be accepted as the name of the species. All writers have synonymised these two, but, curiously enough, have used the name *hoplites*. I can only suppose that they used this latter name on account of Ratzeburg's wording in a paragraph under *laevigatus*, where, discussing *laevigatus* and *hoplites*, and referring to the two names in that order, he said : " Vielleicht muss der *erstere* doch eingehen "— the italics are mine.

Ratzeburg originally described his *hoplites*, in the second volume of his work, from " mehrere ♂ und ♀ " bred by himself from "*Tinea populella.*" In the Ratzeburg Collection standing under this name under a scribbled label, as was to be expected since the species was described in the second volume of his work, were a female and two males. These three specimens are labelled in Ratzeburg's own handwriting " *populella* " and " 3.45 ", and they had been interpolated into the collection immediately below *laevigatus*, but pinned into the wood of the drawer—not into the strip cork. Further, they agree perfectly with Ratzeburg's description, such as it is. There was another female, in addition, in another part of the collection, labelled in Ratzeburg's own hand-

writing simply "*Microgaster hoplites* Ratz.", which also seems to agree perfectly. Despite this, nevertheless, I am unable to accept any one of these four specimens as the type of the species, if only because of Reinhard's statement in 1881. When writing on *hoplites* in 1881 Reinhard stated that "die vorliegenden Original-Expl. aus Ratzeburg's und Brischke's Sammlung" showed that this species and *laevigatus* were identical; and in the Reinhard Collection, under *hoplites*, were three specimens. Of these, one of the two females is labelled in Ratzeburg's unmistakable scribbled writing "*hoplites* R." and "*populella* 3.45". This specimen agrees perfectly with Ratzeburg's original description and with the series in his own collection I have mentioned above, of which it is clearly one example, and should in my opinion be accepted as the type, which almost undoubtedly it is; and I am so labelling it. The remaining three specimens of the Ratzeburg series with the label "*populella* 3.45" are to be accepted as cotypes; and I am so labelling them.

Apanteles laevissimus Ratz.

Microgaster laevissimus Ratzeburg, 1848, *Ichn. d. Forstins.* **2** : 52; 1852, *Ichn. d. Forstins.* **3** : 54.

♀♂. Black; front femora in at least apical half, front tibiae and tarsi wholly (save for the feet), middle femora at apex or in apical fourth, middle tibiae in basal half, hind tibiae in basal two-fifths, the four basal segments of the middle tarsus extensively, the basal segment of the hind tarsus in basal half, and segments 2–4 of hind tarsus at base, red testaceous; segments of the four posterior tarsi otherwise darkened, and the feet black; palpi and tibial spurs pale; wings hyaline, or perhaps very slightly infumated evenly throughout, and the

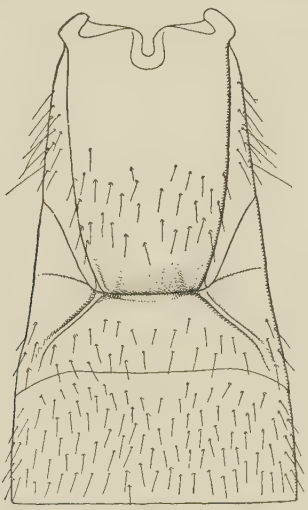

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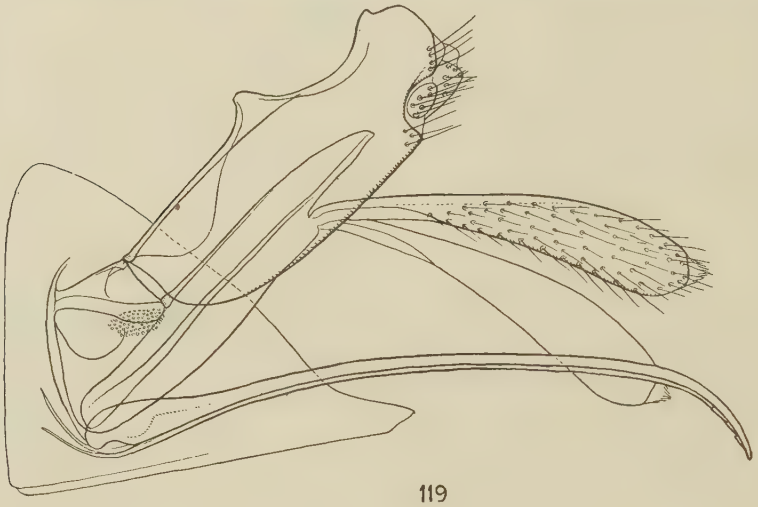
Fig. 118.—*Apanteles laevissimus* Ratzeburg; basal tergites, ♀.

setae coloured (save in basal half of hind-wing); costal veins red testaceous; stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown, the remaining veins colourless; stigma more or less uniformly opaque, without cloud at base.

♀♂. *Head*: face and clypeus throughout with closely placed, minute punctation (degree 2); clypeus noticeably emarginate; the large facial depressions nearer to apex of clypeus than to the eyes; vertex, frons, and frontal orbits, throughout exceedingly minutely

punctate (degree 1); posterior ocelli equidistant from each other and the eyes; flagellum of ♀ considerably shorter than combined length of thorax and abdomen, about equal to combined length of head and thorax together with the two basal tergites, of ♂ equal to combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout with rather closely placed, minute punctation (degree 2), entirely smooth narrowly across apex; disc of scutellum throughout minutely punctate,



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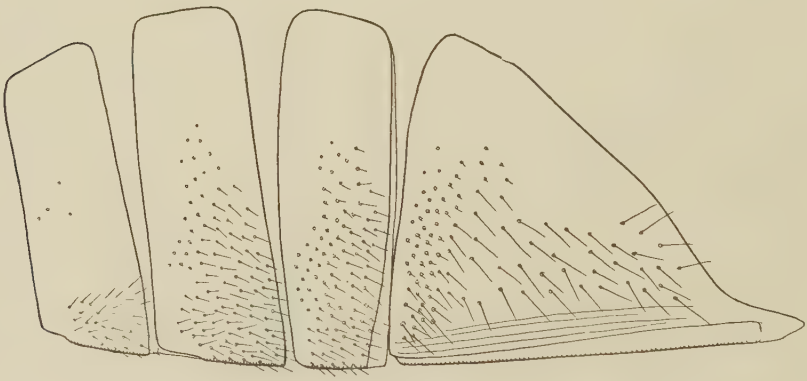


120

Figs. 119 & 120.—*Apanteles laevissimus* Ratzeburg: 119, genitalia, ♀; 120, apical ventrites, ♀.

more sparsely so than the mesonotum; non-excavate area of lateral faces of scutellum clearly reaching up beyond half-way to base of scutellum; propodeon smooth, polished, unsculptured save for some minute punctation basally on each side. Stigma equal in length to metacarp. *Legs*: hind coxae minutely punctate, basally above and perhaps apically above closely so, on outer faces more sparsely; hind tibial spurs equal, rather less than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 118, 119 and 120): 1st tergite basally excavate, apically turned over, in about apical two-fifths with

well-separated, minute punctation, otherwise entirely smooth and polished; 2nd tergite minutely punctate throughout apical half; 3rd tergite smooth narrowly across base and in a small median basal area, otherwise minutely punctate; succeeding tergites minutely punctate; 3rd ventrite of ♀ without median longitudinal suture, medially at base with a small excision; 4th ventrite of ♀ without median longitudinal suture, about basal two-fifths with median longitudinal excision; 5th ventrite of ♀ with median longitudinal suture; hypopygium of ♀ broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths equal in length to hind femur, which is equal to combined length of the three basal segments of the hind tarsus, the ovipositor longer than the hind tarsus, a little shorter than combined length of the hind tibia and basal segment of the hind tarsus.

Length: ♀, 2·75 mm., ♂, 2·5–2·75 mm.

Redescribed from the following material:—Forstliche Hochschule, Eberswalde: Ratzeburg Collection, 1 ♂ (*type*). D. S. Wilkinson's Collection: Bournemouth, Hants, 16 ♀♀, 8 ♂♂, coll. 12.v.1939, em. 16.vii.1939 (*R. L. E. Ford*).

Type in the Ratzeburg Collection, Forstliche Hochschule, Eberswalde.

Host. Ratzeburg originally described the single example of his *laevissimus* to have been bred "aus den Wicklern der *Pinus Pinaster*"; and Ford's series from Bournemouth was bred by him from the Tortricid, *Evetria sylvestrana* Curt., attacking the male flowers of this pine.

Cocoons white, solitary.

Commentary. Ratzeburg originally described his *laevissimus*, in the second volume of his work, from a single female bred by Nördliger at the end of June "aus den Wicklern der *Pinus Pinaster*." In the Ratzeburg Collection standing under this name under a scribbled label, as was to be expected since the species was described in the second volume of his work, was a single male. This specimen is labelled in Ratzeburg's unmistakable scribbled writing "*Micr. laevissimus*", and, on the reverse side, "♀". Further, it agrees perfectly with Ratzeburg's original description (apart of course from his references to ♀ characters), and with the series in my own collection bred by Ford from the Tortricid *Evetria sylvestrana* on *Pinus pinaster*. This male, therefore, is unquestionably to be accepted, despite its sex, as Ratzeburg's original unique specimen, and as the type; and I am so labelling it.

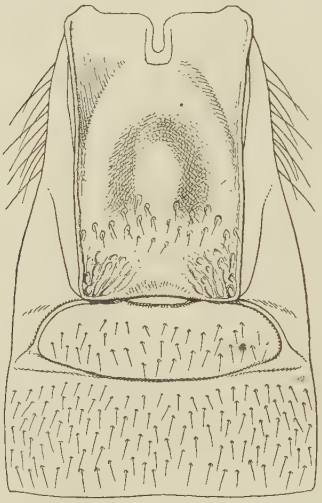
Ratzeburg's description of the ovipositor of this species as being one-fourth the length of the abdomen, and curved downwards, curiously enough agrees quite well with the female material before me. I have, naturally enough, examined this single male specimen of Ratzeburg's very carefully, and I think there is little doubt but that he mistook a portion of the hind leg for the ovipositor. This specimen of his is not very well mounted.

Apanteles longicauda Wesm.

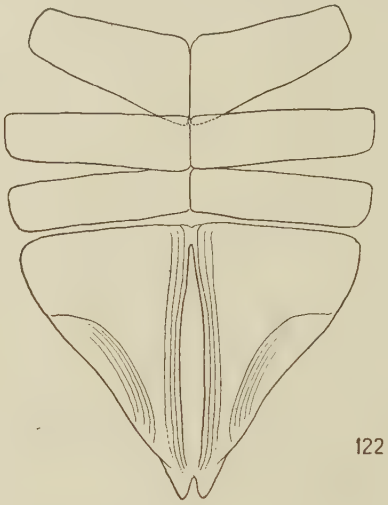
Microgaster longicauda Wesmael, 1837, *Nouv. Mem. Acad. Brux.* **10**: 54.
Apanteles longicauda Wesmael, Wilson, 1928, *Gardener's Chronicle* **83**, no. 2163: 416–418.
Microgaster terebrator Ratzeburg, 1852, *Ichn. d. Forstins.* **3**: 52.

♀♂. Black; the legs in part testaceous as described below, but all the coxae, trochanters, and trochantines, together with the hind femora, are always entirely black, the middle femora also always black or at the most with the extreme apex touched with red, and the hind tarsi always darkened or black; the front femora darkened or black at least in the basal third, red testaceous at least in the apical third; the front tibiae often entirely red testaceous, as often entirely red testaceous with the apical three-fourths of the anterior

margin darkened to black; the front tarsi more usually entirely red testaceous, occasionally slightly darkened; the middle tibiae more usually red testaceous in the basal fourth and black or at least darkened otherwise, sometimes the red testaceous marking only in the extreme base, but on the other hand occasionally occupying the basal half; the middle tarsi



121



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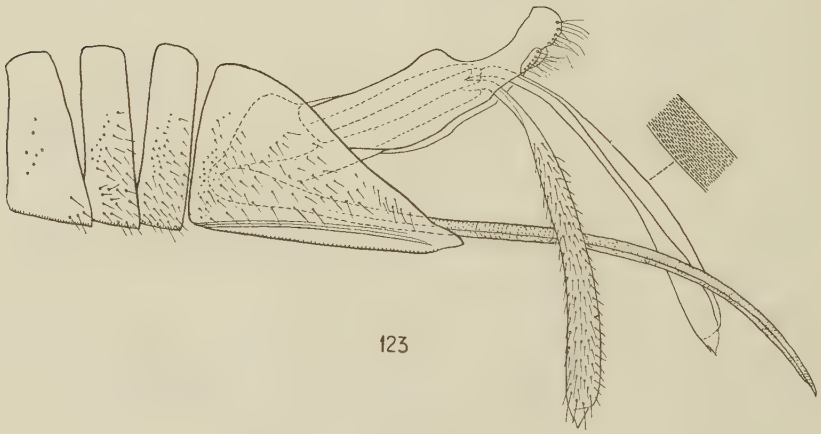

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Figs. 121 & 122.—*Apanteles longicauda* Wesmael: 121, basal tergites, ♀; 122, apical ventrites (ventral), ♀.

Fig. 123.—*Apanteles longicauda* Wesmael; genitalia, ♀.

more usually darkened, but also sometimes entirely red testaceous and sometimes entirely black; the hind tibiae black with red testaceous colouring occupying more usually rather less than the basal fourth, but occasionally only the extreme base, and very occasionally as much as the basal third or half, red testaceous; palpi and tibial spurs pale; costal veins, stigma, and metacarp, brown, as are commonly also the radial and transverse cubital veins, but these latter often paler; the remaining veins more usually paler, even colourless; the stigma uniformly opaque.

♀♂. *Head*: face with regular, closely placed, minute punctation (degree 2); facial

depressions distinctly nearer to apex of clypeus than to the eyes; frons and vertex clearly more sparsely and weakly punctate than the face; posterior ocelli in the female widely separated, rather nearer to the eyes than to each other, in the male rather nearer to each other than to the eyes; flagellum of female with length about equal to combined length of thorax and abdomen, of male longer than combined length of head, thorax and abdomen. *Thorax*: mesonotum and disc of scutellum regularly, minutely punctate, pruinose in certain lights; the slightly rounded scutellar sulcus composed of about sixteen small crenulations, the mesonotum without the usual broad transverse impression; the non-excavate area of the lateral faces of the scutellum in the female clearly reaching up beyond half-way to base of scutellum, with that portion of the excavate area of the lateral faces down each side of the scutellar disc in the form of an elongate, narrow, parallel-sided finger; in the male, however, the non-excavate area not reaching up beyond half-way to base of scutellum and in consequence with the excavated portion down each side of the scutellar disc broad and not parallel-sided, in fact in the more usual form; propodeon almost entirely smooth and shining, with a few very widely spaced punctures, and at extreme apex (particularly medianly) with some carination or rugosity. Metacarp longer than stigma; the distance from apex of metacarp to apex of the obsolete apical abscissa of the radial vein distinctly shorter than the length of the 1st abscissa of the radial vein. *Legs*: hind coxae above and on outer faces throughout with regularly placed minute punctures; the hind tibial spurs equal, or at least subequal, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 121, 122 and 123): 1st tergite excavate basally, tumescent medianly (except in the ♂), and turned over apically, highly polished and entirely smooth save for some punctation in the apical half; 2nd tergite entirely smooth save for some minute punctures; 2nd suture fine, smooth; 3rd and succeeding tergites smooth save for widely placed minute punctation more or less regularly throughout; all ventrites of ♀ with a median longitudinal suture; ovipositor sheaths elongate, equal in length to the hind tarsus, which is about equal to the length of the abdomen; hypopygium membranously acute.

Length: 2·5–3·5 mm.

Redescribed from the following material:—British Museum: British Isles, Wisley, 2 ♀♀, ix.1927 (*G. Fox-Wilson*), determined as *longicauda* by Roman, Brickett Wood, Hertford, 1 ♀, 15.vi.1920 (*H.D.*), Fallowfield, Manchester, 1 ♀, 20.vi.1928 (*H. W. Miles*); Germany, 2 ♀♀, 1 ♂, B.M. Reg. No. 59.101; Marshall Collection, 1 ♂, with on the underside of the card "Groveley Wood". Bignell Collection: 1 ♀, with on the underside of the card the word "Bick" and an indecipherable date; and 1 ♀, with, in Bignell's writing, a label "sicarius marsh.", and with the ser. no. 2650, which in his register has the date 31 May 1885, and the information that the specimen had been bred, with other *Apanteles*, from an unknown host "out of furze, Whitsand Bay." Bridgman Collection: 1 ♀, ser. no. 537, July 1885 (*E. A. Atmore*). Cambridge Museum: 1 ♀, 10.v.1907 (*F.J.*). Imperial Institute of Entomology: British Isles: Somerset, Ashcott, 1 ♀, vi.1933 (*K.G.B.*), determined by Claud Morley as *sericeus* Nees; 1 ♀, without locality data, bred by Blair, and determined by Lyle as *longicauda*; Slough, 1 ♀, no. 34814, 29.ix.1933. Germany: Saxony, 1 ♀, 1 ♂, ser. no. 50, 1 ♀, ser. no. 30 (*Herr Schutze, per Dr. Roman*). Wagner Collection: Hamburg, 1 ♀, ser. no. 340, determined as *chrysostictus*. Laboratorio di Entomologia, Bologna: Italy, 1 ♀, 31 July, determined as *longicauda* by Ferrière; and, Ronzana, 1 ♀, 17.viii.1934.

Further material examined:—Ratzeburg Collection: a pin with two specimens (1 ♀, 1 ♂).

Type in the Musée Royal d'Histoire Naturelle, Brussels; register serial number 2006. *Type* of *terebrator* in the Forstlichen Hochschule, Eberswalde.

Host. The original description of *longicauda* is without host record, but Ratzeburg records that he bred his *terebrator* from the Tineid, *Tinea*, now *Recurvaria*, *leucatella* Clerck. The two females from Wisley were bred from the Tineid, *Simaethis pariana* Cl., on apple and an ornamental species of *Pyrus*, and are part of the material referred to by Fox-Wilson in his paper in the *Gardener's Chronicle*; and I think it is of interest to mention that Mr. Wilson notes that Sorauer and others have recorded this pest from Pear, Sweet Cherry, Peach, Strawberry, Whitethorn, Ash, Mountain Ash, Birch, and Willow. The single female in Herr Wagner's collection was also bred from this host. Theobald also (1928) records this Tineid as a host of *longicauda*. That author notes (1928) that the moth has been referred to the genera *Hemerophila*, *Choreutes*, and *Xylopoda*, in addition to *Simaethis*, and states that, known as the Apple-leaf Skeletoniser, the Apple and Thorn Skeletoniser, and the Flit Moth, it is apparently distributed throughout the Palaearctic and Nearctic regions: but I have not seen this *Apanteles* material, and cannot, therefore, vouch for the determination. The single female from Italy, dated 31 July, was bred from a related species, namely *Simaethis nemorana* Hübn.

The pair from Saxony, ser. no. 50, is recorded to have been bred from the Tineid *Teleia*, now *Telphusa*, *proxima* Hübn., and the other female from Saxony, ser. no. 30, from the Tineid *Gracilaria populetorum* Zell. The single female from Slough also had a Tineid host, namely *Lithocolletis corylifoliella* Haw., while in addition the single female from Manchester is recorded from the Apple Pith Moth, the Tineid *Chrysoclista atra* Haw.

The single female bred by Blair is recorded from the Pyralid (Phycitid) *Rhodophaea*, now *Acrobasis consociella* Hübn., as is also the single female from the Bridgman Collection; and the single female from Ashcott was bred from a Phycitid on *Prunus*. The female from Ronzano is recorded from a Pyralid also.

The only other specimen in the material from which I have redescribed this *Apanteles*, and which has any sort of host record, is the female from Bricket Wood, which is labelled to have been bred from rolled aspen leaves. In this connection it is interesting, perhaps, to refer to Myers' paper (1927) on the Cecidomyiid *Perrisia pyri* Bouché, in which he says that *Apanteles longicauda* and *xanthostigmus* are often bred from curled pear leaves, but they are not necessarily parasites of *P. pyri* since the curled leaves apparently attract a variety of small Lepidopterous larvae.

Cocoons. I have only seen one cocoon, and it is pure white. It belongs to the specimen from Slough.

Commentary. Wesmael originally described this species from two females taken by him in the outskirts of Brussels in June. In the Wesmael Collection in Brussels are three females all labelled *longicauda* and with the same serial number. Of these, two are clearly conspecific, and one of them, the largest, I have therefore labelled as the type: they both agree perfectly, as hereinafter discussed, with material in my possession with which I myself compared them. With the third female I am obviously not further concerned.

The specimen that I have labelled as the type agrees perfectly and in the minutest detail with the single female bred by Blair, save that in this latter the 2nd suture is not sufficiently well marked, and the length of the 2nd and 3rd tergites is in the ratio of 10 to 15, instead of 10 to 17 as in the type. The 2nd tergite is well shown in the specimen from the Bignell Collection labelled " Bick ", but again the 3rd tergite seems somewhat short (9 : 13). The relative lengths of the tergites are not to be taken too seriously in this species, however,

if only because the other of Wesmael's two females has the relative length 9 : 13. The other material that I had with me in Brussels, and which was also compared with Wesmael's specimens, was the female from Slough, one female of the British Museum series registered number 59.101, and the two females from Wisley.

Ratzeburg originally described *terebrator* from material bred by himself in quantity from *Tinea leucatella*. In the Ratzeburg Collection is a pin with a card-point bearing two specimens, a female and a male. These are labelled, a pencilled scribble, in Ratzeburg's own handwriting " Micr. terebrator R ", and they are the only material in the collection with this name. These two specimens (or rather the female), although possibly not part of the material from which Ratzeburg drew up his original description, must unquestionably be accepted as the type of Ratzeburg's *terebrator*, therefore : and I have so labelled them. It should be remarked, finally, that for this species, as for the majority of his species described subsequently to his work of 1844, there is no label carefully written in " copper-plate " writing and pinned into the drawer—in fact there is no label at all save that on the specimen itself : and this pin with its two specimens was standing above the label of, and with the unique specimen of, *rufilabris* !

These two specimens labelled *terebrator* are before me as I write. They agree perfectly and in the minutest detail with the material of *longicauda* from which I have redescribed this species, and, as Reinhard correctly appreciated, are unquestionably referable to this species.

Apanteles longicauda has been confused with *sicarius* Mshl., and *sp. incog. pal. A* = (*fuliginosus* Wesm., of Mshl.), Marshall even going as far as to say that the male of *longicauda* was hardly distinguishable from that of *sicarius*. The three species are, unquestionably, very closely related, but there are excellent and reliable characters with which to separate them, as may be seen from my redescriptions and illustrations; and in this connection particular attention is drawn to the metacarp in conjunction with the length of the ovipositor sheaths, and to the size and shape of the non-excavate portion of the lateral faces of the scutellum.

I have not included in the synonymy of this species any references to Marshall's works of 1885 and 1888. My reasons are that Marshall states therein he has seen only a single representative of this species, a male in the Fitch Collection. There certainly is, or was, a male in the Fitch Collection under this name, but this specimen is not referable to *longicauda*, but to *sicarius*.

Apanteles sicarius Marsh.

Apanteles sicarius Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 209; 1888, *Spécies Hymen. d'Eur.* **4** : 466.
Apanteles chrysostictus Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 466 (**syn. n.**).

♀♂. Black; the legs in part testaceous as described below, but all the coxae, trochanters, and trochantines, together with the hind femora are always entirely black, the middle femora also always black or at the most with the extreme apex sometimes touched with red, and the middle and hind tarsi always darkened or black; the front femora black with invariably some part of the apex red testaceous, more usually with the extreme apex entirely and the apical fourth or third of the sides, commonly with the apical fourth or third entirely, often, however, particularly in the males, with but the extreme apex, red testaceous, the front tibiae usually red testaceous with the apical three-fourths of the anterior margin darkened or black, occasionally (but only in the females) entirely red testaceous,

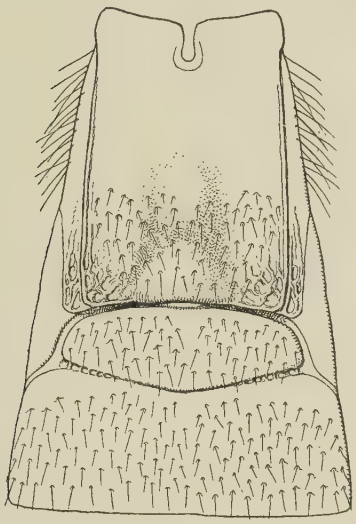
frequently (especially in the males) with only extreme base red testaceous, very occasionally entirely darkened; the front tarsi slightly or distinctly darkened throughout, very rarely red testaceous; the middle tibiae more usually red testaceous in the basal fourth or third in the females, and in the extreme base or basal fourth in the males, in the females very rarely red testaceous either in as much as the basal half or in so little as the extreme base, and never darkened throughout, in the males very rarely red testaceous in as much as the basal half or third, but on the other hand occasionally darkened or black throughout; the hind tibiae red testaceous in the females more usually in the basal third, but also almost as often in the basal fourth, and again almost as often in the basal half, occasionally in rather more than the basal half, very rarely only in the extreme base, and never darkened throughout, in the males red testaceous more usually only at extreme base or in the basal fourth, rarely in so much as the basal third, and very rarely in so much as the basal half, on the other hand sometimes (but very rarely) darkened to black throughout; tibial spurs pale; palpi very occasionally more or less pale or red testaceous, usually darkened or even decidedly darkened; wings, particularly in the males but also commonly in the females, pure hyaline, iridescent, with their setae white, often, however, particularly in the females but also in the males, with weak infumation evenly distributed throughout; costal veins, stigma, metacarp, and radial and transverse cubital veins, brown; the remaining veins more usually paler, or even colourless, but not always, the coloration of the veins being extremely variable and apparently without regard as to whether the wing is white or infumated; stigma uniformly opaque.[8]

♀♂. *Head*: face with regular, closely placed punctation (degree 3), which might at times almost be described as exceedingly minutely rugose; facial depressions distinctly nearer to apex of clypeus than to the eyes; frons and vertex with regular, minute punctation throughout; posterior ocelli widely separated, rather nearer to the eyes than to each other, in a series of small specimens, however, not so widely placed, being in fact nearer to each other than to the eyes; flagellum of female rather shorter than combined length of thorax and abdomen, of male longer than the combined length of head, thorax, and abdomen. *Thorax*: mesonotum and disc of scutellum regularly, minutely punctate, pruinose in certain lights; the slightly rounded scutellar sulcus composed of about sixteen small crenulations, the mesonotum without the usual broad transverse impression; the non-excavate area of the lateral faces of the scutellum in both sexes large but not reaching up beyond half-way to base of scutellum, with that portion of the excavate area of the lateral faces down each side of the scutellar disc in consequence broad and not parallel-sided, in fact in the more usual form; propodeon almost entirely smooth and shining, with a certain amount of minute punctation in the basal half (but this often almost entirely absent), and at extreme apex medianly with more usually some quite definite rugosity. Metacarp of the same length as the stigma; the distance from apex of metacarp to apex of the obsolete apical abscissa of the radial vein distinctly greater than the length of the 1st abscissa of the radial vein; the 1st abscissa of the radial and the transverse cubital veins are variable in length, but the former is always rounded, and the latter persistently exhibits a tendency to thicken. *Legs*: hind coxae above and on outer faces throughout with regularly placed minute punctation; the hind tibial spurs equal, or at least subequal, half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 124, 125 and 126): 1st tergite excavate and smooth in the basal half, more or less tumescent medianly, punctate in the apical half, the sculpture of the apical half, however, variable so that sometimes the punctures are obsolete or almost wanting, and at other times this part of the tergite would be more rightly describable as minutely rugose; 2nd, 3rd, and succeeding tergites smooth save for widely placed minute punctation more or less regularly throughout; 2nd suture fine, smooth; all ventrites of ♀

[8] One or two of the very old specimens before me exhibit a cloud in the basal fourth or third.

with a median longitudinal suture; ovipositor sheaths elongate, in length about equal (when dissected out) to the hind tarsus, which is decidedly shorter than the abdomen; hypopygium membranously acute.

Length: 3·0–3·5 mm.; the series of smaller specimens elsewhere herein referred to, 2·5–3·0 mm.; the type of *chrysostictus*, 2·25 mm.



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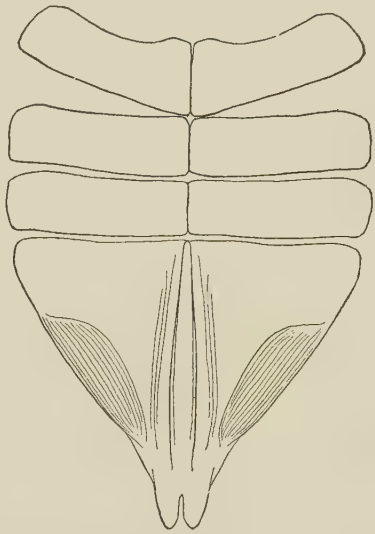

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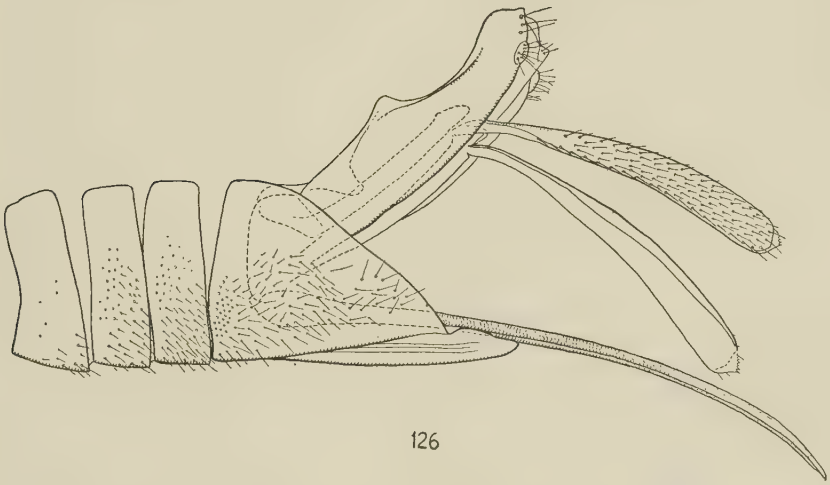

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FIGS. 124 & 125.—*Apanteles sicarius* Marshall: 124, basal tergites, ♀; 125, apical ventrites (ventral), ♀.

FIG. 126.—*Apanteles sicarius* Marshall; genitalia, ♀.

Redescribed from the following material:—BRITISH MUSEUM: Bolt Hd., 1 ♀, July (*G.C.B.*); 1 ♂, 19 June, no. 1852; 1 ♂, Box Hill. BIGNELL COLLECTION: 1 ♂, ser. no. 1852, with on the underside of the card "from thrift, June '8"; a card of four (2 ♀♀, 2 ♂♂) without any data; Scotland, 1 ♀, ser. no.

2665, previously in Bignell's collection under *fuliginosus*; 2 ♂♂, previously in Bignell's collection under *longicauda*, ser. nos. 2071 and 2112, which from the register show the specimens to have been taken at Bolt Head in 1884. Bridgman Collection: 1 ♀, ser. no. 569, which from the register shows that the specimen was bred at Worthing, Aug. 1885 (*W. H. B. Fletcher*); 5 ♀♀, 2 ♂♂, ser. no. 575, the register giving Isle of Wight, end of August, 1885 (*W. H. B. Fletcher*); 1 ♀, ser. no. 855, the register giving Shoreham, June 1887 (*W. H. B. Fletcher*); 1 ♀, 6.v.84, determined as *fuliginosus*. Fitch Collection: a card of two (1 ♀, 1 ♂), Bolt Hd., July, ser. no. 2071; 1 ♂, labelled " A. longicauda Wesm. teste Reinhard ". Cambridge Museum: St. Merryn, 1 ♀, 1902 (*C. G. Lamb*). Imperial Institute of Entomology: Germany, Saxony, 1 ♀, ser. no. 229, 1 ♀, ser. no. 33, 2 ♀♀, 2 ?, ser. no. 148, 3 ♀♀, 9 ♂♂, ser. no. 63.2, 1 ♂, ser. no. 131, 2 ♀♀, 4 ♂♂, ser. nos. 66 and 66.2, 2 ♀♀, 2 ♂♂, ser. no. 170.2, 9 ♀♀, 8 ♂♂, 2 ?, ser. nos. 14, 14.2, 76, and 129, all undated (*Herr Schutze, per Dr. A. Roman*); Department of Zoology, Cambridge, 4 ♀♀, 2 ♂♂, 22.vi.1932, 26.viii.1933, 27.viii.1933, 1933 (*G. C. Varley*).

Type of both *sicarius* and *chrysostictus* in the British Museum.

Host. The original description of *chrysostictus* is without host record. One male of *sicarius* was originally described by Marshall to have been bred by Bignell from the Pyralid *Diasemia litterata* Scop.: but in his own copy of Marshall's work Bignell has erased this record in favour of the Tortricid *Sericoris*, now *Polychrosis, littoralis* Curt.

Of the material in the Bridgman Collection, the female dated 6 May is recorded from the Tineid *Elachista magerlella* Stn., the series no. 575, from a species of the Pyralid genus *Homoeosoma* on yarrow, and the female dated June 1887 from " *Buce. auromaculella*," a name that we have been unable to trace. The single female of August 1885, is recorded from " *Gelechia instabilis*," by which we suggest is meant the Tineid *Phthorimaea instabilella* Doug. Of the remainder of the British material, Bignell's single female from Scotland is recorded " from fir cones," his single male, ser. no. 1852, from thrift, and Varley's series from Cambridge from the Tortricid *Euxanthis straminea* Haw.

All the German material has host records. The single female, ser. no. 229, is recorded to have been bred from the Tineid *Plutella maculipennis* Curt., the ten specimens with serial numbers 66, 66.2, and 170.2, from the Tineid *Paltodora striatella* H.-S., which is now referred to as *Isophrictis anthemidella* Wocke, and the nineteen specimens with serial numbers 14, 14.2, 76, and 129, also from a Tineid, namely *Mompha nodicolella* Fuchs. The thirteen specimens, serial numbers 63.2 and 131, are labelled as parasites of the Tortricid *Conchylis*, now *Phalonia, posterana* Zell. and the single female, ser. no. 33, from the Tortricid *Ancylis lactana* F.

The remaining German series, the two females and two specimens of doubtful sex with serial number 148, is recorded to have been bred from a Dipterous host, namely the Trypetid *Trypeta cylindrica* R.-D.

Cocoons. Only one of the series from which I redescribed the species has cocoons, namely that from Mr. G. C. Varley: the cocoons are pure white.

Commentary. Marshall originally described *sicarius* from a series of four females and two males taken " by Bignell at Bolt Head, Devon, in July," and from " a ♂ " bred by Bignell from " *Diasemia literata*, Scop." In Bignell's own copy of Marshall's monograph of 1885, however, immediately following the host given above, which is erased, are the following words in the manuscript :— " (author's error) *Sericoris littoralis*—19 June 1884."

Of the four females and two males from Bolt Head I have seen, and have

before me at the time of writing, three specimens only. One, a female, is in the Marshall Collection in the British Museum, is labelled " sicarius, Marsh ", with a British Museum type label, and has written on the underside of the card " Bolt Hd. July. G.C.B." The other two are a pair in the Fitch Collection, female and male, labelled " A. sicarius n. sp. Bolt Hd. July ", and mounted together on a Bignell card with his serial number 2071. This serial number in Bignell's register gives " 28 June Apanteles longicaudis Wsm. Bolthead."

Also in the British Museum in the Marshall Collection was a male standing under the name *sicarius*. This specimen is labelled " Diasemia literata, Scop." and has written on the underside of the card " 19 June, 1852." This would seem clearly to be the single male referred to by Marshall, especially since in the Bignell Collection is another male which agrees perfectly and which is labelled " from Thrift June '8 " with the serial number 1852, which gives " 19 June 1884 Apanteles longicauda [erased] sicarius n.s. bred from Thrift, probably from S. littoralis."

These five specimens, namely the two males with serial number 1852 and the three specimens from Bolt Head, are all certainly conspecific, and the single female of this lot belonging to the British Museum should clearly be accepted as the type of the species. Hodgson (1917) appears to have selected as the " type " two specimens from Shere. This is ridiculous, however, because these two specimens were not included by Marshall in his original description, and neither do they belong to the same species as the five specimens discussed above.

Marshall originally described his *chrysostictus* from a unique male, from England simply. In the Marshall Collection in the British Museum is a single male standing under this name, clearly labelled as all the other named Marshall material is labelled, and with a British Museum type label endorsed " C.M." and with the locality " Box Hill " written on the underside of the card. I agree with Morley that this specimen is the type, being most unquestionably the original specimen despite the following few remarks that I have to make. Marshall's statement in the original description of *chrysostictus*, that the tegulae, stigma, and wing-veins are " fauve clair," is incorrect : and it was only on this colour character that he separated this species from his own *sicarius*.

Apanteles sicarius has been much confused with *longicauda* Wesm. It is easily separable from this latter, however, as I have pointed out in the same notes at the end of my commentary on Wesmael's species.

In my above redescription, reference has been made once or twice to some smaller specimens. The material referred to is the nineteen specimens from Saxony bred from *Mompha nodicolella*. These nineteen specimens exhibit a few characters wherewith they might possibly be separated off as a subspecies. I prefer not to do this, however, at least at the moment; our knowledge of all these species is far too meagre.

Apanteles gagates Nees.

Microgaster gagates Nees, 1834, *Hym. Ichn. aff. Mon.* **1** : 183–184. Wesmael, 1837, *Nouv. Mém. Acad. Belg.* **10** : 57. *Apanteles gagates* Nees, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 205; 1888, *Spécies Hymen. d'Eur.* **4** : 462–463.

♀♂. Black; front femora at apex, front tibiae at base and apex and perhaps throughout below, and the tibial spurs, red testaceous; front tibiae otherwise darkened or strongly darkened; wings strongly infumated evenly throughout, save for a hyaline patch below and contiguous with the apical portion of the 1st abscissa, and the pigmented portion of

the 2nd abscissa, of the cubital; the setae coloured; costal veins, stigma, metacarp, and majority of wing-veins, dark brown; stigma uniformly opaque.

♀♂. *Head*: clypeus contiguously punctate (degree 3); face and frontal orbits with rather closely placed minute punctation (degree 2), and frons and vertex with well-separated minute punctation; facial depressions much nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ shorter than combined length of thorax and abdomen, just longer than twice the length of the thorax of ♂ equal to or rather less than combined length of thorax and abdomen together with three times the length of the head, equal to three times the length of the thorax. *Thorax*: mesonotum minutely punctate (degree 2 or even 1), broadly throughout the median longi-

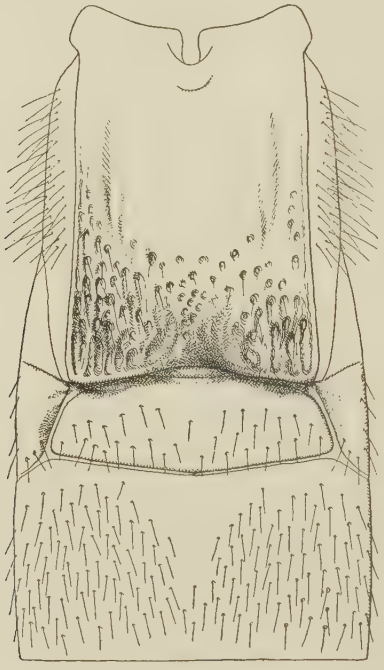

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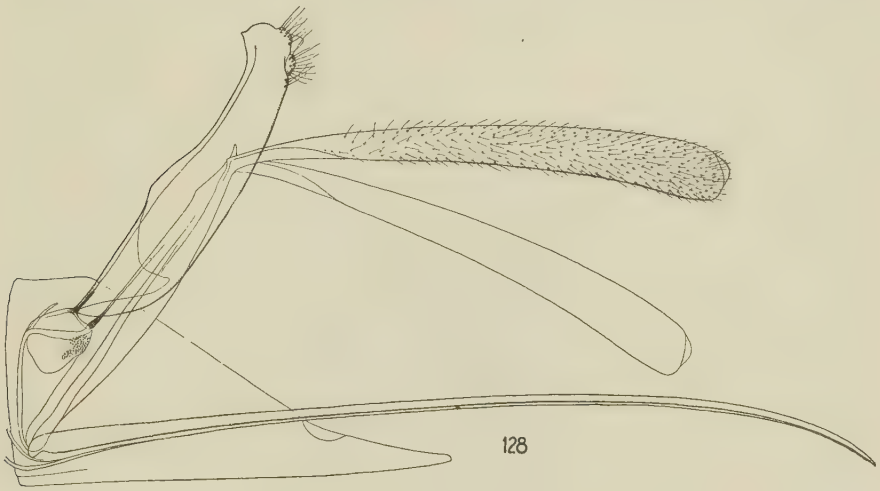
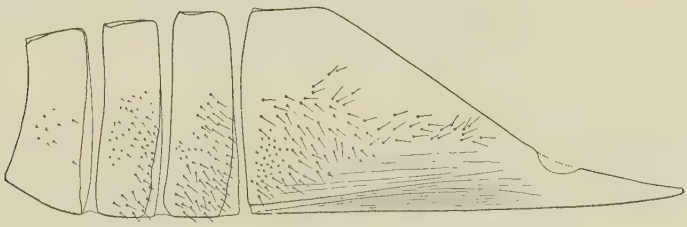
Fig. 127.—*Apanteles gagates* Nees; basal tergites, ♀.

tudinal line noticeably more sparsely so than elsewhere; disc of scutellum minutely punctate laterally, very sparsely so medially; the non-excavate area of the lateral faces of the scutellum large, reaching up beyond half-way to base of scutellum; propodeon in basal half minutely punctate, the slightly impressed median area often with rugosity that has spread up from the apical half, in apical half with transverse rugosity and immediately in front of, and round, the median apical lunule with numerous strong, deeply impressed rugae. Metacarp equal in length to stigma. *Legs*: hind coxae basally above punctate (degree 3), apically above and on outer faces minutely punctate (degree 1); hind tibial spurs equal, rather less than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 127, 128 and 129): 1st tergite in basal half excavate and laterally aciculate, medianly slightly tumescent, apically turned over, in apical two-fifths throughout with ill-defined punctation (degree 3, or even 4) and sculpture, in the ♂ more weakly sculptured; 2nd tergite

smooth save for minute punctation in at least apical half; 3rd tergite narrowly across base, throughout the broad, somewhat membranous apex, and in a large median basal triangle, smooth, otherwise with regularly placed, minute punctation; succeeding tergites minutely punctate; 2nd–5th ventrites of ♀ with median longitudinal suture; hypopygium of ♀ broadly membranous throughout the median line, and its apex more or less mem-





Figs. 128 & 129.—*Apanteles gagates* Nees : 128, genitalia, ♀; 129, apical ventrites, ♀.

branously acute; the apex of the ♀ hypopygium when opened out is very broad, but in dried, mounted specimens it is rolled up longitudinally and so has the appearance of being highly chitinised; ovipositor sheaths longer than hind tarsus, about equal to combined length of hind tibia and the basal segment of the hind tarsus, the ovipositor elongate, longer than twice the length of the hind tarsus, about equal to or just shorter than combined length of hind femur, hind tibia, and the three basal segments of the hind tarsus.

Length : ♀, 3·0–3·5 mm.; ♂, 2·5–3·0 mm.

Redescribed from the following material :—British Museum : Marshall Collection, 1 ♂, "N", 30.viii.1884, det. as *gagates* Nees; Lyle Collection, Gog Magog Hills, 1 ♂, ser. no. 3353, 12.viii.1917, 1 ♂, ser. no. 3367, 19.viii.1917, 1 ♀, ser. no. 3371, 23.viii.1917, 1 ♀, ser. no. 3387, 2.ix.1917, Wicken Fen, 1 ♀, ser. no. 3382, 26.viii.1917, 1 ♀, ser. no. 4396, 15.viii.1920 (*G. T. Lyle*), all det. Lyle as *gagates* Nees; General Accessions, Herts, Brickett Wood, 1 ♀, 17.vi.1936, Boxmoor, 1 ♂, 20.v.1937 (*R. B. Benson*). D. S. Wilkinson's Collection : Cambridge, Gog Magog Hills, 8 ♀♀, 27–29.vii.1937 (*R. L. E. Ford*).

Further material examined :—Musée Royal d'Histoire Naturelle, Bruxelles : Wesmael Collection, 1 ♀ (now *neotype*), 116, mus. ser. no. 2009.

Type lost; *neotype* in the Wesmael Collection, Musée Royal d'Histoire Naturelle, Bruxelles, mus. ser. no. 2009.

Host. The original description of *gagates* is without host record, as is also Wesmael's description of what is now the neotype; and all the material from which I have redescribed the species is without host record or is recorded only as having been swept.

There are a few host records in literature, one of them undoubtedly incorrect. Goureau (1861b and 1869), whose record, apparently, was later quoted by Rondani (1873), Dours (1874), Marshall (1898), Leonardi (1927), and Fahringer (1935), states that this species is a parasite of the Tortricid *Tortrix*, now *Pandemis*, *heparana* Schiff.; but, from his description of what he calls *gagates*, it is quite obvious it was not this latter species he had before him. Dours (1874) quotes Goureau also as the authority for the record of Pterophorid *Platyptilia rhododactyla* Schiff., a record that has been given, so far as I am aware, without, as usual, reference to the original source by Rondani (1876 and 1878), Gaulle (1907), and Leonardi (1927). Rondani (1878) gives as a host the Geometrid *Zerene grossulariae* L., now known as *Abraxas grossulariata* L., a name that Picard (1914b) also mentions, but in a very obscure manner; and Plaas (1923) records this host from literature. Reinhard (1881), whose material I have not yet examined, records that some of his specimens were bred from the Pterophorid *Pterophorus serotinus* Zell., now known as *Stenoptilia bipunctidactyla* Haw., and some from heads of *Scabiosa*; and this Pterophorid record has been quoted by Marshall (1885) and Rudow (1917), incorrectly using the generic name *Mimeseoptilus*, and by Gaulle (1907), Leonardi (1927), and Fahringer (1935). Finally, Fahringer (1935) states that *gagates* is known to him as a solitary parasite of the Tineid *Nemotois minimella* Zell.

Cocoons unknown to me.

Commentary. Nees originally described his *gagates* from an unstated number of females only, from his own collection, taken " prope Sickershausen," and from a single female in the Klug Collection. He gave no host record, and in the second part of his work he did not refer to the name again or give any further indication as to the identity of his species. All the Neesian material is, as is known, lost, and there is nothing in the Klug Collection labelled as *gagates*.

The first reviser of *gagates* Nees is Wesmael 1837. This author redescribed Nees's species from a single female " envoyée des environs de Liége par M. Robert." In the Wesmael Collection in Brussels, under this name, was a single female. This specimen agrees perfectly with Wesmael's description, and also, which is as important, remarkably well, even perfectly, with Nees's original description, and is quite obviously to be accepted as the neotype; and, as may be seen above, I have accepted it and so labelled it. It agrees perfectly and in the minutest detail with all the other material before me of this species.

Apanteles obscurus Nees.

Microgaster obscurus Nees, 1834, *Hym. Ichn. aff. Mon.* **1** : 182. Wesmael, 1837, *Nouv. Mém. Acad. Brux.* **10** : 58–59. *Apanteles obscurus* Nees, Reinhard, 1881, *Deuts. ent. Z.* **25** : 41–42. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 199; 1888, *Spécies Hymen. d'Eur.* **4** : 456–457. Bignell, 1901, *Trans. Devon. Assoc. Adv. Sci.* **33** : 673. Lyle, 1917, *Entomologist* **50** : 52. *Microgaster arenarius* Haliday, 1834, *Ent. Mag.* **2** : 246. *Apanteles arenarius* Haliday, Reinhard, 1881, *Deuts. ent. Z.* **25** : 41–42. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 199.

♀. Black; front femora in apical half or third, the four anterior tibiae wholly, middle femora often at extreme apex, hind tibiae throughout basal three-fourths, red testaceous;

front tarsi red testaceous or slightly darkened, middle tarsi slightly or strongly darkened, and all feet darkened or black; tibial spurs red testaceous or pale red testaceous; palpi with some apical segments pale, otherwise strongly darkened; wings infumated, or even strongly infumated, evenly throughout, and the setae coloured; stigma, metacarp, and wing-veins, brown or even dark brown; stigma uniformly opaque.

♂. Black; front femora at apex, front tibiae wholly, middle tibiae in basal half, hind tibiae in about basal half or three-fifths, and tibial spurs, red testaceous; front tarsi

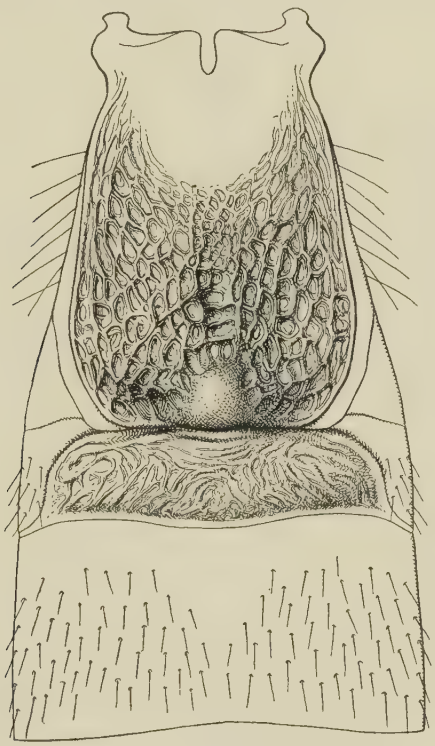


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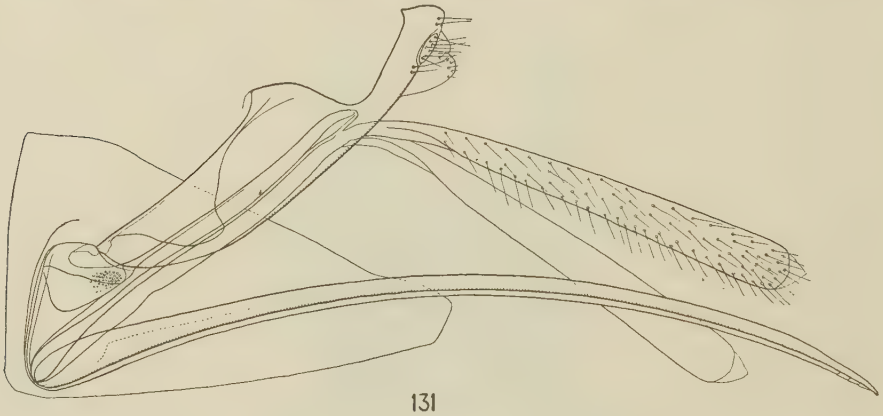
Fig. 130.—*Apanteles obscurus* Nees; basal tergites, ♀.

darkened, and the four posterior tarsi strongly darkened or black; but there is much variation in the colour, particularly of the four posterior tibiae, which are often much more extensively or much less extensively darkened than as stated; palpi much as in ♀, or even more darkened; wings infumated evenly throughout, and the setae coloured; stigma, metacarp, and wing-veins, brown; stigma uniformly opaque.

♀♂. *Head*: face and clypeus minutely punctate (degree 2); facial depressions equidistant from apex of clypeus and the eyes; frontal orbits striate, even rugosely striate; frons and vertex exceedingly minutely punctate (degree 1); posterior ocelli equidistant from each other and the eyes, or rather nearer to the eyes; flagellum of ♀ about equal to combined length of thorax and abdomen, shorter than combined length of head, thorax, and abdomen, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head, longer than three times the length of the abdomen. *Thorax*: mesonotum with well-separated, strong punctation (degrees 3 and 4), across extreme apex entirely smooth, narrowly across the anterior margin, to some extent laterally, and with the lines of the notauli, rugose, the notauli posteriorly longitudinally striate and broad, but

not joining into a common area; scutellar sulcus broad, deep, and strongly crenulate; disc of scutellum with widely separated punctation (degrees 2 and 3), commonly with large areas entirely smooth; the smooth non-excavate area of lateral faces of scutellum reaching up about half-way to base of scutellum; propodeon very coarsely and very strongly reticulately rugose, the areola almost invariably strongly in evidence, but the costulae often lost amongst the strong reticulation. Metacarp and stigma about equal in length. *Legs*: hind coxae above closely punctate (degree 3), but rather variably so in extent and strength, apically above longitudinally striate, on outer faces with very widely separated, extremely



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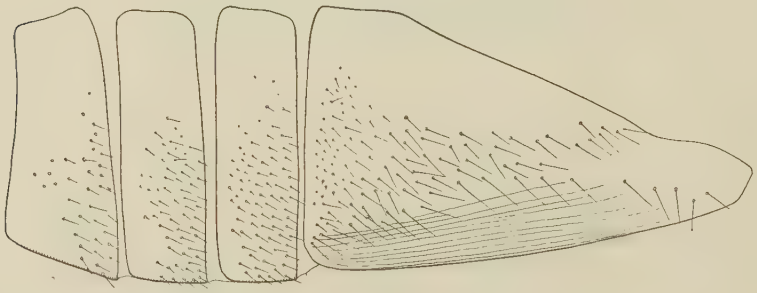

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Figs. 131 & 132.—*Apanteles obscurus* Nees: 131, genitalia, ♀; 132, apical ventrites, ♀.

minute (degree 1) punctation; the longer hind tibial spur two-thirds, and the shorter spur two-fifths, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 130, 131 and 132): 1st tergite basally excavate, in the basal half smooth medially and longitudinally striate laterally, the tergite medially slightly tumescent and rugose, the apical half slightly turned over and rugose and with a large sunken median area, the extreme apex commonly with one or two deeply impressed pits or crenulations on each side of the smooth median apical lunule; 2nd tergite rugulose; 3rd tergite smooth narrowly across apex and base, and in a large median basal triangle, otherwise with minute punctation; succeeding tergites minutely punctate; in ♀, the 3rd tergite to some extent, and the 4th, 5th, 6th, and 7th tergites noticeably, with their posterior margins broadly excised; 2nd, 3rd, 4th, and 5th ventrites of ♀ with median longitudinal suture; hypopygium very broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths equal

in length to the combined length of the four basal segments of the hind tarsus, shorter than the hind tibia, the ovipositor longer than combined length of hind tibia and the two basal segments, but shorter than combined length of hind tibia and the three basal segments, of the hind tarsus.

Length: 3·0–4·25 mm.

Redescribed from the following material:—British Museum: Haliday Collection, a card of two (1 ♀, 1 ♂), no. 12. Ruthe Collection, 2 ♂♂, det. *obscurus* Nees. Marshall Collection, Swanage, 2 ♂♂, Niton, 1 ♂, "Bfmg", 1 ♂, in coll. under *obscurus* Nees. Lyle Collection, New Forest, 2 ♂♂, 26.v.1912, nos. 1964, 1966, Gog Magogs, 3 ♀♀, 1 ♂, 2.ix.1917, nos. 3386, 3388, 3391, 3393, 1 ♂, 7.ix.1919, no. 4146, Halstead, Kent, 1 ♀, 1925, no. 4969A (*G. T. Lyle*), all det. Lyle as *obscurus* Nees. General Accessions: England, Berks, Windsor Forest, 1 ♀, 14.vi.1935 (*H. St. J. Donisthorpe*), Herts, Tring, 6 ♂♂, 15.vii.1936, Bucks, Ivinghoe Common, 1 ♀, 1 ♂, 27.v.1936 (*R. B. Benson*), Scotland, Inverness, Loch Morlich, 1 ♂, 24.vi.1934, Nethybridge, 2 ♂♂, 7.vi.1934 (*R. B. & J. E. Benson*), Yugoslavia, Prenj Mts., Crno Polje, 1300–1700 m., 1 ♀, 15.viii.1936, Konjica Borci, 800 m., 1 ♂, 6.viii.1936 (*V. & E. Martino*). Plymouth Museum: Bignell Collection: 1 ♂, reg. no. 1866, 12.vii.1884, a card of two (2 ♀♀), reg. no. 3621, in reg. dated 3.viii.1887, all det. as *obscurus* Nees; 1 ♀, reg. no. 3707, in reg. dated 24.vii.1888 (*Dr. Chapman*) and det. as *contaminatus* Hal.; a card of two (2 ♂♂), Slade, 21.vii., 1 ♂, Bick, 23.vii.; 1 ♀, det. as *obscurus* Nees. Cambridge University Museum: St. Merryn, 1 ♀, vi.1916 (*C. G. Lamb*), New Forest, 1 ♂, vii.1897 (*D.S.*). Manchester University Museum: Lancashire, Burnley, 1 ♂, 26.viii.1929 (*W. G. Clutten*). Zoologisches Museum der Universität, Berlin: Sachsen, Ob. Lausitz Schirgiswalda, 1 ♀, 25.vii.1893, Wurzen, 1 ♀, 2.vii.1893, Diesbar b. Meissen, 1 ♂, 24.v.1895 (*Dr. R. Krieger*). Zoologisches Museum, Hamburg: "Friedr. Sa.", 5 ♂♂, 2.vii.1893, 9.vii.1893, Billwärd, 1 ♂, 25.vi.1893 (*W. Fick*), all det. Schmiedeknecht as *obscurus* Nees. R. Università, Bologna: 1 ♂, det. Schmiedeknecht as *obscurus* Nees. Universitetets Zoologiske Museum, Oslo: Skien, 2 ♀♀, 1 ♂, no. 144 (*Strand*). Universitetets Zoologiske Museum, Copenhagen: Denmark, a card of five (1 ♀, 4 ♂♂), 7.vi.1885 (*R. W. Schlick*). A. C. W. Wagner's Collection: Sachsen, Bitterfeld, 1 ♀, 1 ♂, no. 246, 24.vii.1902, det. Konow as *obscurus* Nees. Imperial Institute of Entomology: Granaiolo, Firenze, 2 ♀♀, no. 2, 14.vii.1935 (*C. Menozzi*), det. Ferrière as *obscurus* Nees; Palogne B., 1 ♀, 8.ix.1934 (*per Maréchal*). D. S. Wilkinson's Collection: England, Cambridge, Gog and Magog Hills, 1 ♂, 27–29.vii.1937, North Devon, Romansleigh, 3 ♀♀, 3 ♂♂, 26.vii.1938 (*R. L. E. Ford*).

Further material examined:—Zoologisches Museum der Universität, Berlin: Klug Collection, 1 ♀, mus. ser. no. 13099 (now type of *obscurus* Nees). Föerster Collection, Aachen, 1 ♀, vi., 529/23, 2 ♀♀, 536/23. Reinhard Collection, 2 ♀♀ (one now *neotype* of *arenarius* Hal.), 3 ♂♂. Musée Royal d'Histoire Naturelle, Bruxelles: Wesmael Collection, 1 ♀, no. 86, 1 ♀, no. 229, and 1 ♀, 1 ♂, all mus. ser. no. 2011 and det. *obscurus* Nees. Muséum National d'Histoire Naturelle, Paris: Jura, Suisse, 7 ♂♂, 10.vi.1935 (*A. Seyrig*). Naturhistorisches Museum, Wien: Graeffe Collection: 1 ♂, det. *tenebrosus* Wesm.; Trieste, Monte Maggiore, 1 ♂, det. *lateralis* Hal.; 1 ♀, det. *impurus* Nees; 1 ♂, det. *juniperatae* Bouché; Trieste, 1 ♂, viii., det. *glomeratus* L., 1 ♀, viii., det. *vipio* Reinh., 1 ♀, viii., det. *butalidis* Marsh., 1 ♀, ix., det. *ononidis* Marsh.; 1 ♂, det. *viminetorum* Wesm.; 1 ♂, det. *exilis* Hal.; 2 ♀♀, det. *ononidis*

Marsh.; 1 ♂, det. *butalidis* Marsh.; Loitsch-Krain, 9 ♀♀, 13 ♂♂, vii.–viii., det. *ultor* Reinh.; Trieste, 1 ♂, v. and 15.viii. [!], 2 ♀♀, 4 ♂♂, det. *infimus* Hal.; 1 ♀, 1 ♂, det. *infimus* Hal.; Iolmein, 1 ♂, viii., det. *naso* Marsh.; 1 ♀, 2 ♂♂, det. *naso* Marsh.; Trieste, 1 ♀, vi., 1 ♀, viii., Iolmein, 2 ♀♀, 3 ♂♂, Duino, Trieste, 1 ♂, v., Volosca, 8 ♀♀, 12 ♂♂, ix.1902, det. *obscurus* Nees; Kollar, Wien, 1 ♀, no. 103, " Megerl," 1 ♂, no. 101, " Wthm." 1 ♂, no. 102, det. Reinhard as *obscurus* Nees; Alban, Bicaj, 1 ♀, 14–15.vi.1918, Üsköl, 1 ♂, 10.v.1918, Kula Ljums, 1 ♀, 7–14.vi.1918, det. Fahringer as *obscurus* Nees; Istrien, 1 ♀, 9 ♂♂; Tragöss, 1 ♀, vii.–viii.; 3 ♀♀, 2 ♂♂. Other Accessions—S. Tirol, Radein, 2 ♀♀, 3 ♂♂; Tschek, 3 ♀♀, 1872, Tschek, Piesting, 1 ♀; Piesting, 1 ♀, 2 ♂♂, 8.v.1866, 20.v.1866.

Type of *obscurus* Nees in the Klug Collection, Zoologisches Museum der Universität, Berlin; mus. ser. no. 13099. *Type* of *arenarius* Hal., lost; *neotype* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin, under *obscurus* Nees.

Host. The original descriptions of both *obscurus* and *arenarius* are without host record. Of the material from which I have redescribed the species Bignell's male no. 1866 is recorded by him both in his register and in his paper on the Ichneumonidae of S. Devon (1901) to have been bred from the Pyralid *Ebulea*, now *Pionea*, *crocealis* Hübn.; and from this host are recorded also Bignell's female no. 3707, which, apparently, is not the female referred to by Bignell in 1901, and Lyle's female no. 4969A, while Menozzi's two females from Firenze are recorded by him to have been bred from *Pionea ferrugalis* Hübn., a species known in the British Museum as *P. martialis* Guén. All the other material before me is without host record.

In the literature there are a few further records, of which all must be treated with considerable reserve. Laboulbéne (1877) records that Giraud bred the species from the Trypetid fly, *Trypeta*, now *Tephritis*, *arnicae* L., and Fahringer (1922) mentions a note by a Dr. Tölg also giving a Dipteron as a host, namely the Muscid *Pegomyia nigritarsis* Zett.; but both these records I am sure are incorrect. Uffeln's record (1930) of the Zygaenid *Zygaena filipendulae* L. is clearly to be rejected, since, on his own showing, the parasite he was discussing was a gregarious species; and on this score also, and from the size of the *Apanteles* cocoons, Fahringer's records (1922) of the Tortricids *Pammene germariana* Hübn. on *Prunus domestica* and *Cornus mas*, and *Tortrix*, now *Argyrotoxa*, *forskaleana* L. on *Acer campestris*, must also be rejected. Finally, Johnson (1919) has recorded as a host of this species in Ireland the Nymphalid *Melitaea artemis* Schiff., Goidanich (1928) the Geometrid *Chlorissa viridata* L., and Miles (1927), but doubtfully, the Tineid *Epermenia chaerophyllella* Göze.

Cocoons white.

Commentary. Nees originally described his *obscurus* from an unstated number of females in his own collection captured by himself, and from an unstated number of captured females and males in the Klug Collection. He gave no host record, and in the second part of his work he did not refer to the name again or give any further indication as to the identity of his species. All the Neesian material, we know, is lost. In the Klug Collection, however, is a single female labelled " *M. obscurus* N. v Es. ♀ ". This specimen not only agrees perfectly and in the minutest detail with Nees's original description, but also with all subsequent writers' interpretation of the species, and, since all the other original material is lost, is obviously to be accepted as the type; and I am so labelling it. It agrees perfectly with all the material before me from which I have redescribed the species.

Since the genus *Apanteles* was originally proposed by Förster, and since Viereck (1914) cited *obscurus* Nees as the genotype, I find it extremely satisfactory to be able to record, further, that this specimen from the Klug Collection I am accepting as the type of *obscurus* agrees perfectly and in the minutest detail with three females in the Föerster Collection under the name *Apanteles obscurus*, which, from their labelling, so I am kindly informed by Dr. Bischoff, are unquestionably original material examined by Föerster himself—that is to say, not material later incorporated by von Halfern into the Förster Collection after Förster's death.

Haliday originally described his *arenarius* from an unstated number of specimens of both sexes in the collection of the Entomological Society of London, (" Mus. Soc. Ent. "), the material having been captured, the habitat being given as " in *Salice argenteâ* arenarum aestate copiesè." In the remains of the Entomological Society's Collection in the British Museum there is no material labelled with this name. The type is lost, therefore.

The first reviser of *arenarius* Hal. is Reinhard 1881. This author synonymised and sank this name under *obscurus* Nees, and redescribed the species from an unstated number of females and males, stating that it was a very common species but that its hosts were unknown. In the Reinhard Collection, under the name *obscurus*, are two females and three males. This material is unquestionably what I understand to be *obscurus*, and it agrees perfectly with Reinhard's description of *obscurus* and also, which is as important, with Haliday's original description of *arenarius*, and is quite obviously to be accepted as the series from which a neotype must be selected; and, as may be seen above, I have selected a female as the neotype and so labelled it.

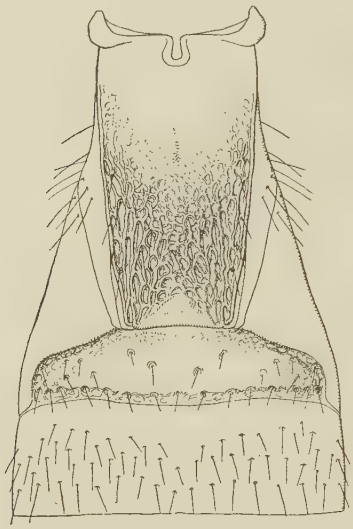
Apanteles parasitellae Bouché.

Microgaster parasitellae Bouché, 1834, *Nat. Ins.* : 153.
Apanteles lictorius Reinhard, 1881, *Deuts. ent. Z.* **25** : 37. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 191. Marshall, 1888, *Spécies Hymen. d'Eur.* **4** : 440.
Apanteles polypori Gautier et Bonnamour, 1930, *Bull. Soc. ent. France* **1930** : 108 (**syn. n.**).
Microgaster flavilabris Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 69; 1848, *Ichn. d. Forstins.* **2** : 49, Pl. 2, fig. 19; 1852, *Ichn. d. Forstins.* **3** : 50.
Microgaster rufilabris Ratzeburg, 1844, *Ichn. d. Forstins.* **1** : 69; 1848, *Ichn. d. Forstins.* **2** : 49; 1852, *Ichn. d. Forstins.* **3** : 50.
Apanteles adjunctus Nees, Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 190–191; 1888, *Spécies Hymen. d'Eur.* **4** : 439–440.

♀. Black; the mouthparts, often certain portions of the scape, tegulae, the four anterior legs (including the coxae but excluding the feet), at least apical half of hind coxae, the hind trochanters and trochantines, hind femora, basal half of hind tibiae, hind tarsal joints basally, the lateral membranous portions of the basal tergites, and majority of the ventrites, red testaceous; flagellum dark brown; palpi and tibial spurs pale; wings hyaline, the setae coloured; some veins in middle of wing, and stigma, brown, the costal veins and metacarp more or less brown; stigma uniformly opaque.

♂. Agrees with colour description of female save that the hind coxae are red testaceous at most only at apex, and are often entirely black, and that the ventrites are not so extensively red testaceous.

♀♂. *Head*: face, clypeus, frons, and vertex, throughout regularly and minutely punctate, rather more strongly so on the face (degree 2) than on the frons and vertex (degree 1); facial depressions about equidistant from apex of clypeus and the eyes, or perhaps just nearer to apex of clypeus; posterior ocelli nearer to each other than to the eyes; flagellum of ♂ considerably longer than the combined length of head, thorax, and abdomen, longer even than the combined length of thorax and abdomen together with twice the length of



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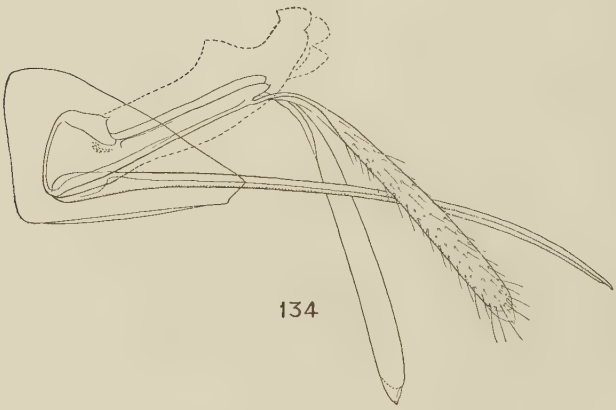

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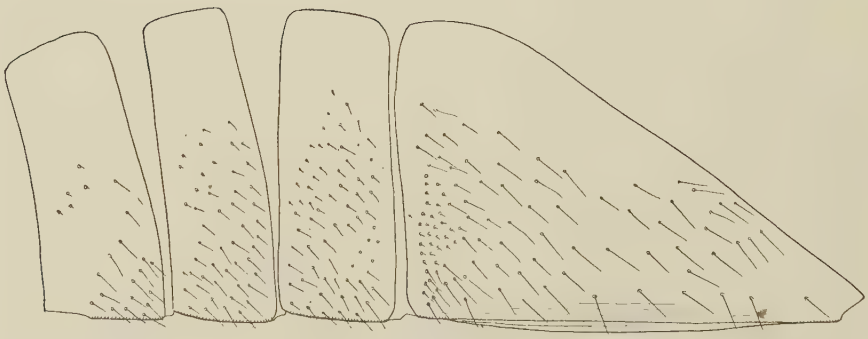

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Fig. 133.—*Apanteles parasitellae* Bouché; basal tergites, ♀.

Figs. 134 & 135.—*Apanteles parasitellae* Bouché: 134, genitalia, ♀; 135, apical ventrites, ♀.

the head, of ♀ shorter than combined length of thorax and abdomen. *Thorax*: mesonotum and disc of scutellum throughout regularly, minutely (degree 3) punctate; propodeon smooth save for certain rugosity radiating from the medial apex for a short distance and save for certain median longitudinal rugosities, all of which are extremely variable in extent and strength so that in one specimen they are obsolete to wanting and in another strongly marked, apparently without reference to size or sex. A punctiform 2nd abscissa of the radial almost invariably present; there is also present quite commonly certain indefinite pigmentation running from the punctiform 2nd radial to the apex of the 2nd abscissa of the cubital, so that at first glance an areola often appears to be present. *Legs*: hind coxae basally above with a varying amount of variable, strong punctation (degree 3 to 4), otherwise above and on outer faces smooth with widely placed, minute punctation; in ♀ the longer hind tibial spur about four-sevenths, and the shorter spur about three-sevenths, the length of the basal joint of the hind tarsus, in ♂ the hind tibial spurs almost describable as subequal, and the longer spur just less than half the length of the basal joint of the hind tarsus. *Abdomen* (figs. 133, 134 and 135): 1st tergite in the basal half excavate and smooth throughout the greater area, in the apical half strongly turned over and rugose, save that in some small males this rugosity is obsolete; 2nd tergite strongly transverse, smooth save for an occasional strong puncture discally, for a row of punctures across extreme apex, and for its lateral, widely diverging sulci (and the 2nd suture) which are broad and commonly rugose so that the two extreme lateral angles of the tergite are also more or less rugose; 3rd tergite smooth, with much well-separated minute punctation (degree 1) save across base; succeeding tergites with the usual minute punctation; majority of ventrites of ♀ with median longitudinal suture; ovipositor sheaths with length equal to that of a hind tarsus; hypopygium not strongly chitinised, its apex acute, the extreme apex membranously so.

Length: 2·5–3·25 mm.

Redescribed from the following material:—British Museum: Marshall Collection, 1 ♂ (det. *lictorius* Reinh.). Bridgman Collection: 3 ♀♀, 2 ♂♂, ser. no. 7 [?]. Cambridge Museum: New Forest, 1 ♂, June 1902 (*D. Sharp*); 1 ♀, 17.vii.21. Zoologisches Museum der Universität, Berlin: Berlin, Fromholz, 1 ♀, 1 ♂, 14/5.89. A. C. W. Wagner's Collection: Reinb. Sa., 2 ♀♀, 9/7.93 (*W. Fick*), det. Schmiedeknecht one as *circumscriptus* Nees and the other as *falcatus* Nees; Eppdf., 1 ♂, 25.viii.01, det. Konow as *lictorius* Reinh. D. S. Wilkinson's Collection: Oxfordshire, 1 ♂, viii.1934 (*D. S. Wilkinson*). Imperial Institute of Entomology: France, Vierne (Isère), 1 ♀, 1 ♂, 1924 (*Falcoz*), det. Ferrière as ? *hoplites* Ratz.; France, 1 ♀, 1934, det. Ferrière as *lictorius* Reinh.; Germany, Saxony, 1 ♀, 1 ♂, ser. no. 30, 2 ♂♂, 2 ?, ser. no. 31, 3 ♀♀, 3 ♂♂, ser. no. 34, 1 ♀, ser. no. 47, 1 ♀, 1 ♂, ser. no. 86 (*Herr Schutze, per Dr. Roman*); Liebenau, 1 ♀, 9.viii.32; 1 ♀, 58/32 (*per Dr. Blair*).

Further material examined:—Bouché Collection: Berlin, 1 ♀ (*type*). Reinhard Collection: 3 ♀♀ (one now *type* of *lictorius*), 1 ♂; Danzic, 2 ♂♂; 1 ♀ (under "*Microgaster dorsalis* Nees"). Ratzeburg Collection: 1 ♂, labelled with the number 29 (now *type* of *flavilabris*); 1 ♂, labelled with the number 125; 1 ♀, unlabelled (*type* of *rufilabris*). British Museum: France St. Genis-Laval (Rhône), 1 ♀, 1 ♂, iv.1927 (cotypes of *polypori*).

Type of *parasitellae* in the Bouché Collection, Zoologisches Museum der Universität, Berlin; register serial number 13101. *Type* of both *flavilabris* and *rufilabris* in the Ratzeburg Collection, Forstlichen Hochschule, Eberswalde. *Type* of *lictorius* in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial number 26985. *Type* of *polypori* presumably either in Gautier's or Bonnamour's Collection; a pair of cotypes in the British Museum.

Host. This species was originally described by Bouché as a solitary parasite of the Tineid *Tinea parasitella* Hübn.; but he qualified his statement by adding " auch zu drei bis vier." The original description of *flavilabris* is without host record; but in his third volume Ratzeburg gives the record " *Tortr.* ? *hercyn.*" The original description of *rufilabris* is without host record also; but in his third volume Ratzeburg gives " ? *Tin. padella.*" The original description of *lictorius* is without host record: that of *polypori* has the record that the material had been bred from some larva inhabiting *Polyporus hispidus* Bull.

Of the material from which I have redescribed this species, Herr Schutze's series no. 30 is labelled to have been bred from *T. parasitella* also, the series no. 31 from *Tinea granella* L., the series nos. 34 and 86 from *Tinea cloacella* Haw., and the series no. 47 from the Tineid *Incurvaria morosa* Z., now known as *Lampronia quadripunctella* Steph. The pair from Vierne is labelled to have been bred doubtfully from the Melandryid beetle *Orchesia micans* Panz. in *Polyporus*, a beetle that Gautier and Bonnamour also succeeded in breeding when they were rearing their *polypori*, but which, of course, they did not take to be the host of the *Apanteles*: *Tinea parasitella* and *cloacella* are both fungus-feeders, and are the much more likely hosts. The single female of Dr. Blair's is labelled to have been bred from a species of *Tinea*, simply; but I am now informed by him that he considers the host to be a species of the Psychid genus *Fumea*, probably *F. casta* Pall., and that the cases were collected at Chilworth on 21.v.1932. All the other material is without host record.

The single female in the Fitch Collection, previously determined by Marshall as *adjunctus* Nees, is recorded both by Marshall and on the underside of the card to have been bred by Elisha from the Pterophorid, *Leioptilus microdactylus* Hübn., a species now known as *Pterophorus osteodactylus* Zell.

Silvestri (1922), in a paper on *Gypsonoma neglectana* Dup., records that he himself observed *lictorius* as a parasite of this Tortricid. He both describes and figures the adult *Apanteles*, but unfortunately neither description nor figure agrees at all well with my material from which I have redescribed the species: nor have I as yet been able to examine any of Silvestri's material. In addition, Silvestri gave the biology of whatever species he had before him, and figured the larva.

Cocoons unknown to me, though described by Bouché as " weisslich."

Commentary. Bouché originally described his *parasitellae* from an unstated number of specimens of apparently the female sex only, and as a parasite of *Tinea parasitella*. In the Bouché Collection is a single female labelled in the usual manner for this collection with five labels—" Berlin "; the serial number 13101; a red " type " label; the usual Stein label, " Parasitellae Bouch * "; and with the usual Enderlein label, but in this case " *Apanteles lacteus* Nees ". This specimen agrees perfectly, or as perfectly as is to be expected, with Bouché's original description, such as it is, and I am convinced that Stein and Enderlein were correct to accept it as the type of the species: it agrees, also, perfectly and in the minutest detail with the material from which I have made the redescription, some of which material was also bred from *Tinea parasitella*.

Nees (1834), in his addenda to his work, synonymised Bouché's species under his own *lacteus*, but with a query. This synonymy was accepted by Marshall unconditionally. I cannot accept it, however, since the original description of *lacteus* cannot even be made to agree with *parasitellae*.

Ratzeburg originally described his *flavilabris*, in the first volume of his work, from one or more females, the number not being stated. The material had been bred by a certain H. Saxesen. In the Ratzeburg Collection standing under

this name, with the label written in his copper-plate handwriting, as was to be expected since the species was described in the first volume of his work, were two specimens, both males and both in very bad, damaged condition. One is merely labelled with a number, but the other, in addition to a number, bears a label in Ratzeburg's scribbled handwriting—" flavilbr." This material is quite obviously to be accepted as the original series since, in addition to bearing the scribbled label and being in the correct place in the collection, it agrees with Ratzeburg's description, particularly with regard to the shape of the areola. The question of the sex and of the description of the ovipositor, the abdomen having been described as " mit kaum hervorragendem Bohrer," is easily explained—Ratzeburg mistook the male aedeagus for the female ovipositor ! I have labelled as the type the specimen numbered 29 : it would seem to be the older. Both specimens are unquestionably referable to *parasitellae.*

Ratzeburg originally described his *rufilabris,* in the first volume of his work, from a unique female in his own collection that he had himself bred. In the Ratzeburg Collection standing under this name, with the label written in his copper-plate handwriting, as was to be expected since the species was described in the first volume of his work, was a single female. This specimen, which agrees with Ratzeburg's description, particularly with regard to the shape of the areola, is obviously to be accepted as the type ; and I have so labelled it. It is unquestionably referable to *parasitellae.*

This mistake of Ratzeburg's with regard to the sex of the specimen(s) of his *flavilabris,* and consequently also with regard to the length of the ovipositor, satisfactorily explains, also, why he made so much of the colour differences between *flavilabris* and *rufilabris,* and why he described them as distinct species. However, it should be remarked in addition, in his favour, that the two male specimens (*flavilabris*) are rather on the small side and are not well sculptured, whereas the single female (*rufilabris*) is one of the largest and most strongly sculptured examples of *parasitellae* that I have as yet seen.

Reinhard originally described his *lictorius* from an unstated number of both females and males, giving finally *M. ruficornis* (Nees) Wesmael, as a synonym. That is to say, therefore, that Reinhard considered *ruficornis* Nees *vero* and *ruficornis* (Nees) Wesmael to be distinct. However, when Reinhard was writing under the name *lictorius* he was not merely renaming the Wesmaelian material but was in fact describing a new species, since he gives characters for *lictorius* that are not mentioned by Wesmael for his *ruficornis.* The type of *lictorius* therefore is to be found in the Reinhard Collection and not in Brussels. In the Reinhard Collection are three females and three males standing under the name *ruficornis* Nees : there were no specimens labelled *lictorius.* These six specimens cannot possibly be Reinhard's final and considered interpretation of *ruficornis* Nees, not only on account of the length of their ovipositor sheaths, which definitely do not agree with Nees's description (*Ich. Aff.* 2 : 402), but also since Reinhard never wrote on *ruficornis* Nees, and did not include it in his revision of the genus. Further, these six specimens agree perfectly not only with the original description of, but also in the characters used in the key for, *lictorius.* Again, when describing his *lictorius,* which as shown above was done from actual specimens, Reinhard makes no mention of receiving any material from Brussels or from any other source, as he so often does for material of other species received from other collections. It is surely clear, therefore, that Reinhard, using Wesmael's paper, originally determined these specimens as *ruficornis* Nees, and that later, finding that they did not agree with Nees's description, described them as new, adding the Wesmael reference more or less

as an afterthought. I am convinced as to this, and have selected one specimen as the type, and so labelled it. This material is quite obviously the same species as *parasitellae* Bouché.

Gautier and Bonnamour originally described *polypori* from an unstated number of both females and males bred at St. Genis-Laval (Rhône): and shortly after the publication of the paper Dr. Gautier, on my request, was so good as to present to the British Museum the female and male to which I have referred above, and which are unquestionably cotypes. These specimens are quite obviously referable to *parasitellae*.

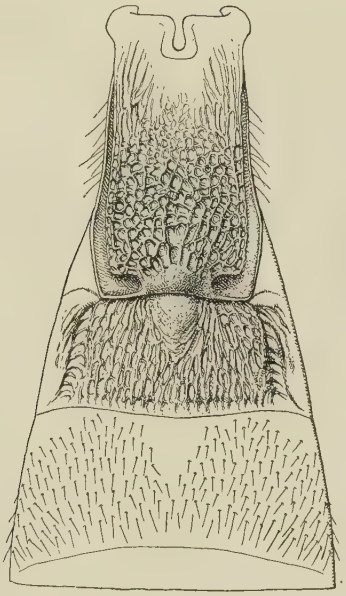
Apanteles butalidis Marsh.

Apanteles butalidis Marshall, 1888, *Spécies Hymen. d'Eur.* **4**: 450–451. Hodgson, 1917, *Trans. Devon. Ass. Adv. Sci.* **49**: 412.

♀. Black; front femora throughout at least apical third and much more extensively along the sides, front tibiae commonly throughout (but often much or even entirely darkened), front tarsi occasionally to some extent, middle femora to some extent at apex below and even occasionally quite extensively at apex below, middle tibiae in about basal third to two-thirds, hind tibiae at base or in about basal fourth, red testaceous; palpi and tibial spurs pale; wings infumated, or even strongly infumated, evenly throughout, and the setae coloured; wing-veins, stigma, and metacarp, uniformly brown; stigma uniformly opaque.

♂. Black; occasionally front femora on sides of extreme apex and front tibiae at extreme base, and more rarely hind tibiae at extreme base, red testaceous or with some indication of such colouring; palpi strongly darkened or black; spurs of front tibiae darkened, of four posterior tibiae pale; wings hyaline or faintly infumated; setae of fore-wing coloured, of hind-wing colourless or white save perhaps towards apex of wing; wing-veins, stigma, and metacarp, uniformly brown; stigma uniformly opaque.

♀♂. *Head*: clypeus and face throughout with closely placed punctation (degree 3), often even describable as rugoso-punctate, the frontal orbits, frons, and vertex, with closely placed minute punctation (degree 2), sometimes even describable as minutely rugoso-punctate; facial depressions in ♀ equidistant from apex of clypeus and the eyes, or nearer to the eyes, in ♂ equidistant from apex of clypeus and the eyes, or nearer to apex of clypeus; posterior ocelli nearer to each other than to the eyes; flagellum of ♀ about equal to or just shorter than combined length of thorax and abdomen, of ♂ equal to combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum in the broad lateral areas with closely placed, strong punctation (degree 4) throughout, and medianly commonly so describable, otherwise rugose or rugoso-punctate, especially the lines of the notauli and the posterior area into which they lead, which are all ill-defined; disc of scutellum with much, shallow, ill-defined, more or less rugose punctation; non-excavate area of lateral faces of scutellum scarcely reaching up half-way to base of scutellum; propodeon reticulately rugose, down the medial line sunken or slightly sunken, medially at extreme base with one or two deep pits bordered by short strong carinae. Metacarp shorter than stigma. *Legs*: hind coxae basally above and in upper half generally throughout with fine, short, minute, longitudinal aciculation or aciculate punctation, otherwise on outer faces with regularly placed but ill-defined minute (degree 1) punctation, apically above longitudinally aciculate or striate; the longer hind tibial spur barely half, and the shorter spur two-fifths or three-eighths, the length of the basal segment of the hind tarsus. *Abdomen* (figs. 136, 137 and 138): 1st tergite in basal half excavate, shining, and longitudinally striate, in apical half much thickened and rugose, apically not or hardly turned over, the apical half with a broad, shallow, median, longitudinal depression, the upper layer of the tergite at apex strongly contracting and the lower layer not so contracting so that there is a very large and deep fovea on each side of the median apical lunule; 2nd tergite with



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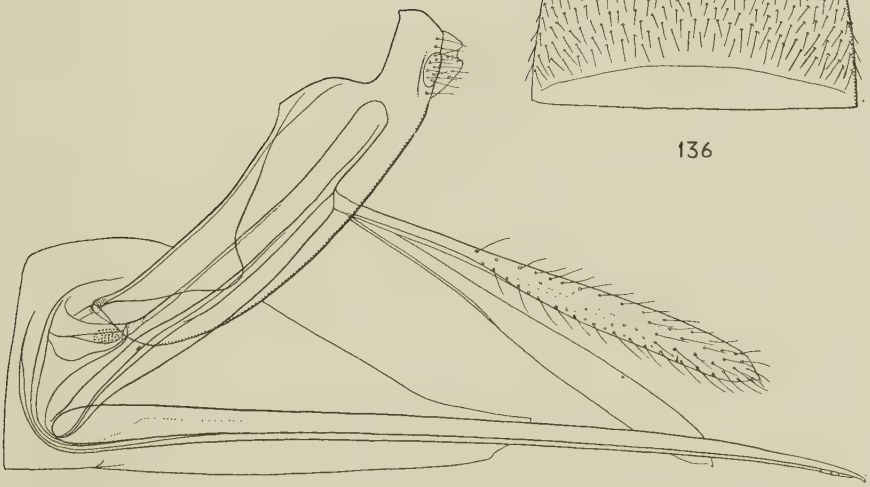

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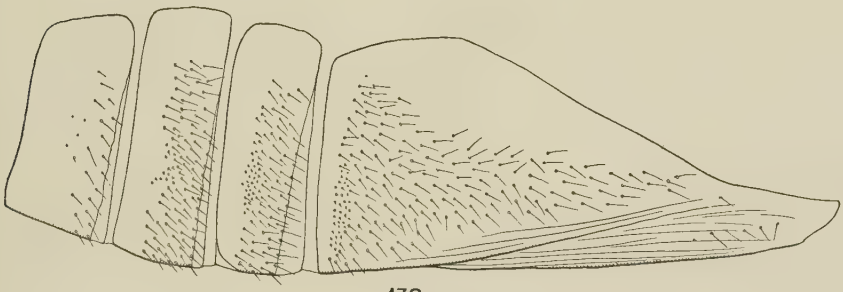

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Fig. 136.—*Apanteles butalidis* Marshall; basal tergites, ♀.

Figs. 137 & 138.—*Apanteles butalidis* Marshall: 137, genitalia, ♀; 138, apical ventrites, ♀.

rugose (or at least weakly rugose), more or less longitudinal striation or aciculation throughout, in the ♀ apically perhaps slightly emarginate; 3rd tergite smooth in a median basal triangle, narrowly across base, and broadly across apex, otherwise with closely placed, minute punctation; succeeding tergites with closely placed, minute punctation; in the ♀ the 3rd–7th tergites with their posterior margins noticeably broadly and membranously excised, these membranous areas impunctate; 2nd–5th ventrites of ♀ with median longitudinal suture; hypopygium of ♀ very broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths shorter than hind tibia, rather shorter than combined length of the four basal segments of the hind tarsus, the ovipositor rather shorter than combined length of hind tibia and the two basal segments of the hind tarsus.

Length: ♀, 2·5–3·0 mm.; ♂, 2·5–2·75 mm.

Redescribed from the following material:—British Museum: General Accessions: Sweden, Degaberga, 1 ♀, 10.vii.1938, 1 ♂, 12.vii.1938 (*D.M.S.P. & J.F.P.*). Plymouth Museum: Bignell Collection, 1 ♀ (*type*), reg. no. 3617, in register dated 23.vii.1887 (*J. H. Wood*). Norwich Castle Museum: Bridgman Collection, 2 ♀♀, reg. no. 848, det. as ? *arenarius* Hal. and in collection under *obscurus* Nees, in register recorded from Arundel, 8.vi.1887 (*W. H. B. Fletcher*). D. S. Wilkinson's Collection: England, Portland Bill, Dorset, 1 ♀, 1 ♂, coll. 8.v.1938, em. 10.vi.1938, 54 ♀♀, 50 ♂♂, coll. 8.v.1939, em. 28.v.1939 (*R. L. E. Ford*).

Type in the Bignell Collection, Plymouth Museum; Bign. reg. no. 3617.

Host. Marshall originally described the single example of his *butalidis* as a parasite of the Tineid *Butalis*, now *Scythris*, *fuscoaenea* Haw. With the exception of the pair from Sweden, which was swept, and of Bridgman's two females, all the remainder of the material before me was bred by Ford from *Scythris senescens* Stn. Bridgman's two females are recorded by him to have been bred from "*Butalis fusco-cuprella*." But there is no such species referable to *Scythris*, and, consequently, either one must suppose he intended to write *fuscoaenea*, or, as seems to be possible, the species he intended to record was the Tineid *Roeslerstammia fusco-cuprella* Haw., now known as *R. erxlebella* F., which, I am informed, is extremely like a *Scythris*.

In the literature, the only original record is Morley's (1936) of two females bred by Bankes at Swanage from *S. senescens* Stn.

Cocoons white, solitary, occurring inside the silken "run" or puparium that is constructed by the host larva and which is covered loosely and indiscriminately with debris.

Commentary. Marshall originally described his *butalidis* in 1888 from a single female bred in England by Bignell from "*Butalis fuscoaenea* Haw." In the Bignell Collection was a single female labelled as "*Apanteles butalidis* n.sp.", and bearing the Bignell register number 3617; and in the Bignell register under this number, and with the date 23 July 1887, this specimen is recorded as "*Apanteles butalis* [sic] N.Sp. Marshall. from *Butalis fusco-aenea*. J. H. Wood." This specimen already bore a type-label, affixed by whom I do not know, and it is quite obvious it is indeed this specimen that is to be accepted as the type of the species; and I am so labelling it. It agrees perfectly and in the minutest detail with all the other material before me from which I have made my redescription of the species.

Apanteles ater Ratz.

Microgaster carbonarius Ratzeburg, 1848, *Ichn. d. Forstins.* **2** : 52.
Microgaster ater Ratzeburg, 1852, *Ichn. d. Forstins.* **3** : 56
Apanteles impurus Nees, Bignell, 1901, *Trans. Devon. Ass. Adv. Sci.* **33** : 673.

♀. Black; apical half of front femora, front tibiae and tarsi wholly (save for the black feet), hind tibiae basally to a varying extent, red testaceous; middle tibiae more or less darkened above, more or less red testaceous below, and the middle tarsi darkened; palpi pale, and the tibial spurs of the four posterior legs white; wings hyaline, and the setae coloured; costal veins, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins colourless; stigma uniformly opaque, but commonly more or less hyaline discally.

♂. Agrees with my description of colour of ♀ save as follows : Legs much more strongly

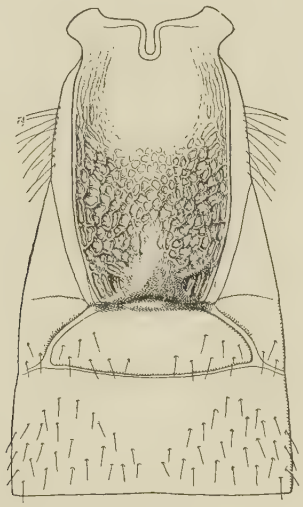

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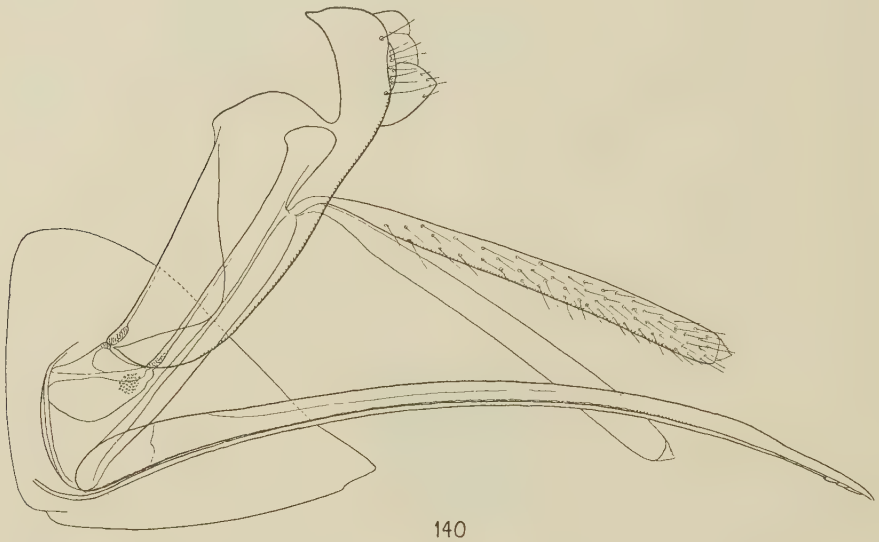
Fig. 139.—*Apanteles ater* Ratzeburg; basal tergites, ♀.

darkened; wings white hyaline, and the setae white; costal veins, more usually only periphery of stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown or very light brown; stigma more usually discally hyaline.

♀♂. *Head* : face, clypeus, frons, and vertex, minutely punctate (degree 1, and perhaps 2); facial depressions perhaps just nearer to apex of clypeus than to the eyes; frontal orbits aciculate; posterior ocelli nearer to each other than to the eyes; flagellum of ♀ shorter than twice the length of the thorax, of ♂ variable, longer than combined length of head, thorax, and abdomen, often longer than thorax and abdomen together with twice the length of the head. *Thorax* : mesonotum always entirely smooth and highly shining in a small area across extreme apex, otherwise closely punctate throughout (degree 3), the lines of the notauli narrow, striate or striato-punctate, and posteriorly broad, striate; disc of scutellum exceedingly minutely punctate (degree 1) along the sides and with a few such punctures medially, otherwise entirely smooth and shining; the non-excavate area of the lateral faces of the scutellum large, reaching up about half-way to base of scutellum; propodeon with a clearly marked, margined, smooth and shining areola from base to median apical lunule, the lateral margins of the areola diverging from base to a point about one-

third its length, thence converging to apex and straight, the areola thus being V-shaped in apical two-thirds, the propodeon in basal half on each side of areola rugose or rugosely carinulate, and even sometimes with more or less complete costulae. *Legs*: hind coxae basally above, and above, closely minutely punctate (degree 2), on outer faces sparsely so; the longer hind tibial spur one-half, and the shorter spur about one-third, the length of the



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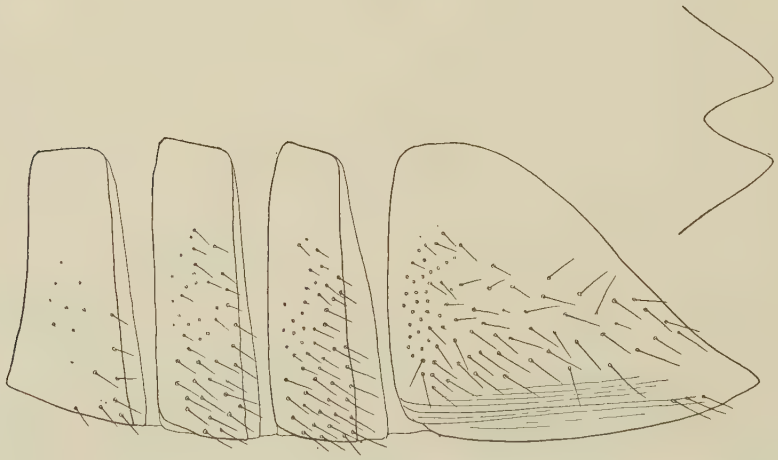

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Figs. 140 & 141.—*Apanteles ater* Ratzeburg: 140, genitalia, ♀; 141, apical ventrites, ♀.

basal segment of the hind tarsus. *Abdomen* (figs. 139, 140 and 141): 1st tergite in basal half or two-fifths medially excavate and smooth, laterally longitudinally striate, the tergite medially tumescent and rugose, apically turned over, in apical half rugose (or at least with sculpturing), and often with a median, longitudinal, broad, shallow, impressed area, the median apical lunule prominent and entirely smooth, and each apical angle depressed or with a large punctiform depression; in ♂ the 1st tergite in apical half is more strongly

contracted than in ♀ and than as figured; 2nd tergite with some minute punctation across in apical half, otherwise smooth, its short sulci either straight or slightly curved, in ♂ the sulci and the tergite longer than in ♀; 2nd suture not bisinuate; 3rd tergite smooth across base and in a large median basal triangle, otherwise minutely punctate; succeeding tergites minutely punctate; 2nd–5th ventrites of ♀ with median longitudinal suture; hypopygium of ♀ broadly membranous throughout the median line, and its apex membranously acute; ovipositor sheaths just shorter than hind tibia, the ovipositor just shorter than combined length of hind tibia and the three basal segments of the hind tarsus.

Length: ♀, 2·0–2·75 mm.; ♂, 1·75–2·5 mm.

Redescribed from the following material:—British Museum: Ruthe Collection, Germany, 2 ♀♀, det. as *ochrostigma* Wesm., 1 ♀, det. as *impurus* Nees; Lyle Collection, a card of nine (6 ♀♀, 3 ♂♂), Cambridge, 16.vi.1917, reg. ser. no. 3195 (*G. T. Lyle*), a card of four (3 ♀♀, 1 ♂), Spalding, vi.1925, reg. ser. no. 4972 (*H. W. Miles*), all det. Lyle as *impurus* Nees; General Accessions: Kent, E. Malling, 14 ♀♀, 2 ♂♂, vi.1936. Plymouth Museum: Bignell Collection, a card of five (2 ♀♀, 3 ♂♂), 2.viii.1884, reg. no. 1940, det. as *impurus* Nees. Zoologisches Museum der Universität, Berlin: Erfurt, 6 ♀♀ (*Curt Beer*). Forstliche Hochschule, Eberswalde: Ratzeburg Collection, 1 ♀ (*type*). Zoologisches Museum, Hamburg: Mellingstedt, 1 ♀, 15.vii.1918, det. as *sodalis* Hal. Universitetets Zoologiske Museum, Copenhagen: a card of fourteen (13 ♀♀, 1 ♂), Saalborg, 22.vi.1920 (*C. S. Larsen*). C. Ferrière's Collection: France, Lyon, three cards of four (4 ♀♀; 2 ♀♀, 2 ♂♂; 1 ♀, 3 ♂♂), and 4 ♀♀, 1 ♂, 14.vi.1911 (*J. Riel*). A. C. W. Wagner's Collection: Hamburg, 3 ♀♀, no. 60, 3.vii.1911, Mellingstedt, 1 ♀, 1 ♂, no. 47, 11.vii.1918, Cranz, 3 ♀♀, no. 44, 2.vii.1932. Imperial Institute of Entomology: Kent, E. Malling, 7 ♀♀, 2 ♂♂, no. 288, host coll. 25.viii.1933, par. pup. 1.ix.1933, par. em. 6.ix.1933, 3 ♀♀, 1 ♂, no. 299, host coll. 30.viii.1933, par. pup. 13.ix.1933, par. em. 18.ix.1933 (*G. L. Hey*).

Type of *ater* Ratz. (= *carbonarius* Ratz., n. praeocc.) in the Ratzeburg Collection, Forstliche Hochschule, Eberswalde.

Host. Ratzeburg originally described his *ater* to have been bred by himself from, probably, *Operophtera brumata* L., in spun-up apple-blossom.

Of the material from which I have redescribed the species, however, the two series bred by Hey are recorded by him as a gregarious parasite of the Tortricid *Cacoecia podana* Scop., on apple, and Wagner's pair numbered 47 and the single female from the Hamburg Museum are recorded from the Tineid *Hyponomeuta malinella* Zell.; and either of these two apple-feeding species is just as likely to have been the host of Ratzeburg's original specimens. The Lyle material from Cambridge is recorded by him from *Tortrix*, now *Cacoecia*, *podana*, on *Euonymus*, his material from Spalding merely from a species of *Tortrix*, Wagner's three females numbered 60 from *C. podana*, without mention of the host-plant, and Bignell's five specimens from *Tortrix forsterana* F. The series from the General Accessions of the British Museum are labelled to have been bred from the Tortricid *Notocelia uddmanniana* L., and Riel's series from Lyon from simply a species of *Tortrix* on *Ribes rubrum*. Wagner's three females from Cranz are recorded simply from a green caterpillar on poplar. The remainder of the material before me is without host record.

This species is quite clearly gregarious. Hey, in a letter to me, reports that each of his two series was bred from a single caterpillar. Both of Lyle's series, and Bignell's and Riel's series, were, from the cocoons, also obviously bred from a single caterpillar.

In the literature there are no further host-records, a few authors merely giving Ratzeburg's original record of *brumata*.

Cocoons white, invariably heaped together indiscriminately in a small mass, and often with a very thin, communal, outer covering of silk.

Commentary. Ratzeburg originally described his *carbonarius*, in the second volume of his work, from an unstated number of specimens of unstated sex bred by himself from spun apple-blossom, " wahrscheinlich aus der *brumata*." In the Ratzeburg Collection standing under this name, under a scribbled label, as was to be expected since the species was described in the second volume of his work, was a single female. This specimen was labelled in Ratzeburg's unmistakable scribbled writing " *carbonarius* Rtz ", and " *brumata*—7.46 ", and it agrees perfectly with the original description. This specimen, consequently, is unquestionably to be accepted as the type of the species; and I am so labelling it. It agrees perfectly and in the minutest detail with all the material before me from which I have redescribed the species.

In addition to this female there were also two other pins, each with a card-point. One of these pins is labelled " brum? pomor? "; and the other is without any label. Both card-points have one or two unrecognisable, broken pieces of an *Apanteles*.

Ratzeburg, in the third volume of his work, substituted the name *ater* for his *carbonarius* on discovering that this latter was preoccupied. He did not, apparently, trouble to change the name on his specimens, and there were no specimens labelled *ater* in his collection.

It is amusing to note that Ratzeburg was careful to state in the original description of his species that he had examined Wesmael's book, and that yet he succeeded in choosing for his new species one of Wesmael's names; and then, after discovering his mistake, that he had the temerity to put the blame upon Wesmael for having no index to his paper.

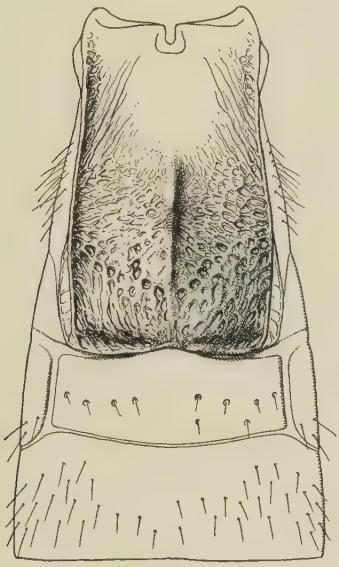
Apanteles ultor Reinh.

Microgaster lactipennis Ratzeburg, 1852, *Ichn. d. Forstins.* **3** : 54–55, 247 (*nom. preocc.*).
Apanteles ultor Reinhard, 1881, *Deuts. ent. Z.* **25** : 38–39. Marshall, 1885, *Trans. ent. Soc. Lond.* **1885** : 193; 1888, *Spécies Hymen. d'Eur.* **4** : 445.

♀♂. Black; legs red testaceous, except that all coxae and feet are black, that the trochanters of the four posterior legs, the hind tarsi, and the apical tarsal joint of the four anterior legs, are darkened, and that there is a dark or even black spot on the inner side of extreme apex of hind tibiae; palpi and tibial spurs pale to pale red testaceous; wings hyaline, the setae coloured, but the setae of the hind-wings often apparently colourless; stigma, metacarp, and certain portions of the costal veins, light brown, the remaining veins very lightly pigmented or even hyaline; stigma not uniformly opaque since there is usually a weak, ill-defined cloud basally.

♀♂. *Head*: face and clypeus rugose; facial depressions nearer to apex of clypeus than to the eyes; frontal orbits closely punctate (degree 3); frons and vertex closely minutely punctate throughout; posterior ocelli nearer to each other than to the eyes; flagellum of ♀ rather shorter than combined length of head, thorax, and abdomen, of ♂ just shorter than combined length of thorax and abdomen together with twice the length of the head. *Thorax*: mesonotum throughout strongly punctate (degrees 3 and 4), the punctures rather closely placed, and rather more closely placed and stronger along the lines of the notauli and in the apical area into which they lead, than elsewhere, but the limits of the lines of the notauli not well indicated; mesonotum entirely smooth narrowly across extreme apex, but this smooth area not extending so widely as the base of the scutellum; disc of scutellum

with some punctures and striae along the sides, and with some scattered punctures (degree 3) discally, otherwise smooth; the non-excavate area of the lateral faces of the scutellum reaching up only about half-way to base of scutellum; propodeon (fig. 143) *figured*. *Legs*: hind coxae above, both basally and at apex, and on outer faces, minutely punctate (degree 1); the hind tibial spurs subequal, about two-fifths the length of the basal joint of the hind tarsus. *Abdomen* (figs. 142, 144 and 145): 1st tergite basally excavate and smooth save for oblique striation at the sides, medianly with a strong rugose tumescence, from the summit of which there runs for some distance towards apex of tergite a median longitudinal carina, which, gradually becoming weaker, is lost about half-way between the summit of the tumescence and the apex of the tergite, the tergite apically turned over, the apical half



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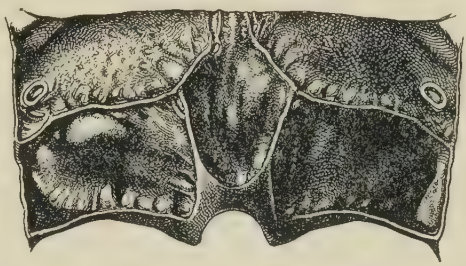

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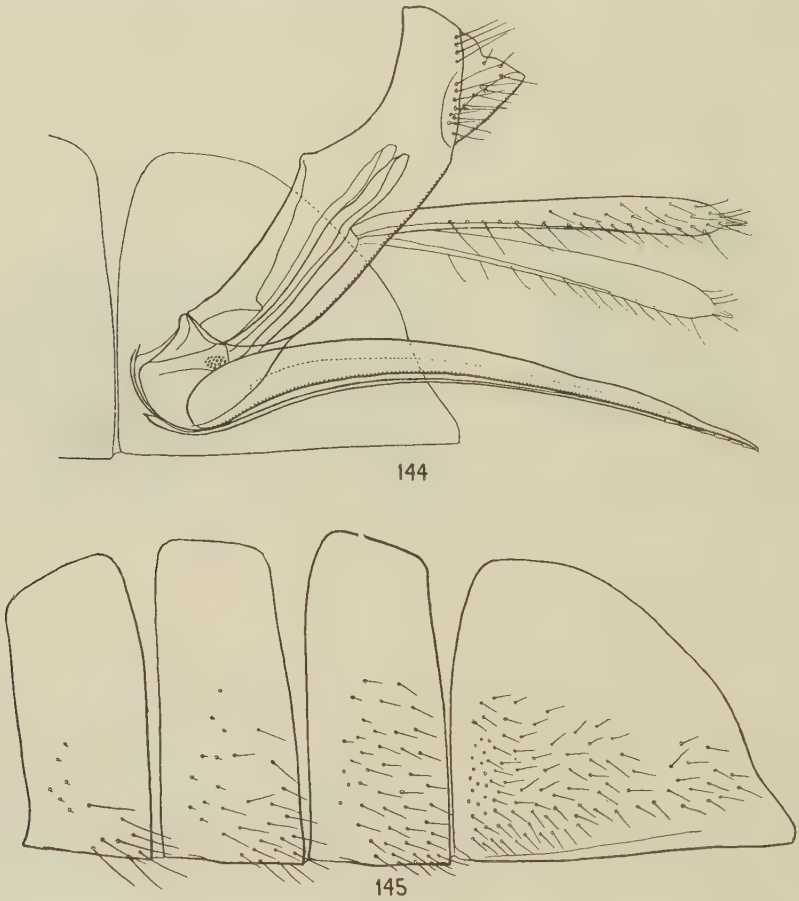
FIGS. 142 & 143.—*Apanteles ultor* Reinhard: 142, basal tergites, ♀; 143, propodeon, ♀.

with much striation and sculpture and some strong (degree 4) punctures, the extreme apex of the tergite depressed, and the median apical lunule present as usual but not smooth; 2nd tergite smooth save for some strong, but shallow, punctures transversely across about its centre; 2nd suture only weakly defined; 3rd tergite with widely separated, minute punctation in each lateral third, and with an irregular, transverse row of such punctures apically joining these two areas, otherwise and broadly all across base entirely smooth; succeeding tergites with the usual minute punctation; ventrites of ♀ without median longitudinal suture throughout; 1st ventrite with median apical excision; 2nd ventrite with rudimentary median longitudinal suture almost throughout; 3rd ventrite with median longitudinal suture basally; 4th and 5th ventrites with broad median basal excision; hypopygium more or less membranous broadly along the median line, and its apex to some extent membranously acute, its extreme apex truncated or perhaps slightly rounded; ovipositor sheaths rather shorter than the combined length of the basal and the 2nd joint of the hind tarsus, the ovipositor equal to or rather shorter than the hind tarsus.

Length: 2·5 mm.

Redescribed from the following material:—BRITISH MUSEUM: Marshall

Collection, Maldon, 1 ♂, 25.viii.1884, det. by Marshall as *ultor* Reinh.; Lyle Collection, a card of sixty-two (42 ♀♀, 19 ♂♂, 1 ?), Gog Magogs, ser. no. 3356, 15.viii.1917 (*G. T. Lyle*), det. Lyle as *ultor* Reinh.; 2 ♀♀, 1 ♂, 1920 (*Fox-Wilson*), det. Lyle as *ultor* Reinh. Ratzeburg Collection: a pin mounting three (2 ♀♀, 1 ♂), ser. no. 1046, otherwise unlabelled. Reinhard Collection: 1 ♀, reg. no. 26947. D. S. Wilkinson's Collection: England, Kent, Bexley, 22 ♀♀, 11 ♂♂, pup. 9.vii.1937, em. 20.vii.1937 (*R. L. E. Ford*).



Figs. 144 & 145.—*Apanteles ultor* Reinhard: 144, genitalia, ♀; 145, apical ventrites, ♀.

Further material examined:—Reinhard Collection: 5 ♀♂, reg. no. 26947.

Type of *lactipennis* in the Ratzeburg Collection, Forstliche Hochschule, Eberswalde; ser. no. 1046. The original, or part of the original, series from which Reinhard redescribed the species, and renamed it *ultor*, in the Reinhard Collection, Zoologisches Museum der Universität, Berlin; register serial no. 26947.

Host. Ratzeburg originally recorded his *lactipennis* to have been bred by

Brischke from the Lymantriid *Bombyx*, now *Euproctis*, *chrysorrhoea* L.; and in the addenda to the volume in which he published his species he recorded further that Rosenhauer bred it from the Lasiocampid *Bombyx*, now *Malacosoma*, *neustria* L. Reinhard, when redescribing the parasite under the name *ultor*, gave the above two hosts and added a third, the Lymantriid *Liparis auriflua* D. & S., a species now known as *Porthesia similis* Fues.

Of the material from which I myself have redescribed this species, apart from the Ratzeburg and Reinhard specimens, both that from the Gog Magog Hills and that from Bexley is recorded by Lyle and Ford respectively to have been bred by them from *Porthesia similis*; while Fox-Wilson's three specimens are recorded from the Lymantriid *Orgyia antiqua* L. Marshall's single male is recorded by him to have been captured.

Cocoons white, arranged, like a pile of drain-pipes, regularly side by side and one above the other, in rows, so that both ends are exposed.

Commentary. Ratzeburg originally described his *lactipennis*, in the third volume of his work, from an unstated number of both females and males. In the Ratzeburg Collection standing under this name, with the label scribbled, which was Ratzeburg's practice with species added by him to his collection subsequently to the publication of his first volume, were three specimens; and these are before me as I write. They are mounted on one pin—that is to say, one pin is driven through all three specimens, so that they could not be separated without considerable risk of damage—and, as previously stated, they comprise two females and one male. This material, which agrees with Ratzeburg's description, such as it is, and with Reinhard's description and material of his *ultor*, which is very convenient, is obviously to be accepted as the Ratzeburg original series; and I have labelled it with a type label, thereby referring to the first, or upper, specimen, which incidentally is the only female of the two in reasonably good condition. These specimens agree perfectly and in the minutest detail with all the material of this species from which I have made the redescription, including all the Reinhard material.

Reinhard originally put forward the name *ultor*, in place of *lactipennis* Ratz., without remark other than that the Ratzeburg name was preoccupied, which in fact it is although the Curtis name, *lacteipennis*, is not spelt in quite the same manner. Reinhard redescribed the species from an unstated number of females, and the material now in his collection under this name is quite obviously that which he originally had before him, despite its comprising both females and males.

It is, perhaps, here worthy of remark that no specimen of this material of Reinhard, which he described under the name *ultor*, is to be accepted as the type of the species *ultor*, although the name *ultor* is valid. The type of the species is still one of Ratzeburg's specimens.

Apanteles lacteicolor Vier.

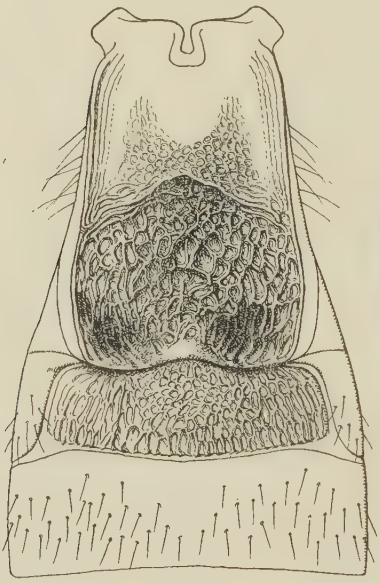
Apanteles (*Apanteles*) *lacteicolor* Viereck, 1911, *Proc. U.S. Nat. Mus.* **40** : 475. *Apanteles lacteicolor* Viereck, Howard & Fiske, 1912, *Bur. ent. U.S. Dept. Agric., Bull.* **91** : 1–344. Muesebeck, 1918, *J. agric. Res.* **14** : 191–206; 1920, *Proc. U.S. Nat. Mus.* **58** : 520.
Apanteles viminetorum Wesmael, Lyle, 1917, *Entomologist* **50** : 52.

♀. Black; front femora (save basally or basal half), front tibiae (save often for some darkening), front tarsi (save for black feet), middle femora at apex above and in apical third below, middle tibiae basally or in basal half, hind tibiae basally or in basal half, basal segment of hind tarsus at extreme base, red testaceous; middle tarsi strongly darkened;

palpi and tibial spurs pale or white; wings hyaline, the setae coloured; stigma, metacarp, certain portions of the costal veins, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, brown, the remaining veins lightly pigmented or even hyaline; stigma uniformly opaque.

♂. Black; front femora at apex or in apical half, front tibiae and tarsi (save for much darkening and for black feet), middle femora at extreme apex below, middle and hind tibiae at base or at extreme base, red testaceous; palpi darkened; middle and hind tibial spurs white; wings white hyaline, the setae white; stigma, metacarp, certain portions of the costal veins, brown, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins hyaline; stigma often [9] discally hyaline.

♀♂. *Head*: face, clypeus, frons, and frontal orbits, minutely punctate (degree 2); vertex coriaceous; facial depressions nearer to apex of clypeus than to the eyes; posterior ocelli equidistant from each other and the eyes; flagellum of ♀ equal in length to or rather



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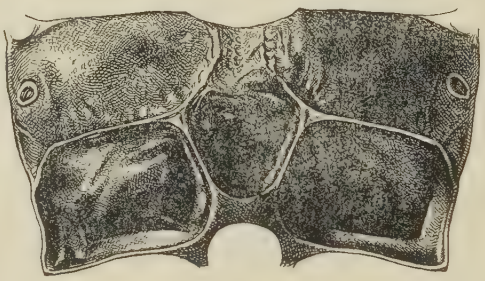

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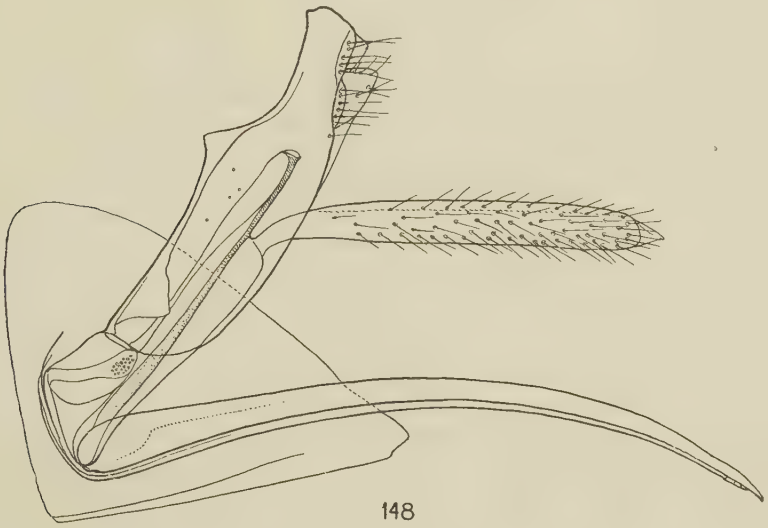
Figs. 146 & 147.—*Apanteles lacteicolor* Viereck: 146, basal tergites, ♀; 147, propodeon, ♀.

longer than combined length of head, thorax, and abdomen, of ♂ about equal to combined length of thorax and abdomen together with three times the length of the head, or nearly three times the length of the thorax. *Thorax*: mesonotum throughout strongly punctate (degrees 3 and 4), the punctures rather closely placed, and more closely placed still and rather stronger along the lines of the notauli and decidedly stronger and more widely placed in the large apical area into which the notauli lead, than elsewhere, but the limits of the lines of the notauli not well indicated, especially in smaller specimens, the mesonotum across extreme apex entirely smooth save for exceedingly minute (degree 1) punctation; disc of scutellum with well-separated, minute punctation (degrees 2 and 3); the non-excavate area of the lateral faces of the scutellum reaching up only about half-way to base of scutel-

[9] This may be due, perhaps, only to immaturity. I have before me stigmas with every degree of coloration from discally entirely clear hyaline to entirely and absolutely opaque.

lum; propodeon *figured* (fig. 147). *Legs*: hind coxae basally above with some minute punctation (degrees 2 and 3), otherwise above and on outer faces entirely smooth save for some widely spaced, exceedingly minute (degree 1) punctures; hind tibial spurs equal in length, or at least subequal, just shorter than half the length of the basal segment of the hind tarsus. *Abdomen* (figs. 146, 148 and 149): 1st tergite basally excavate and finely



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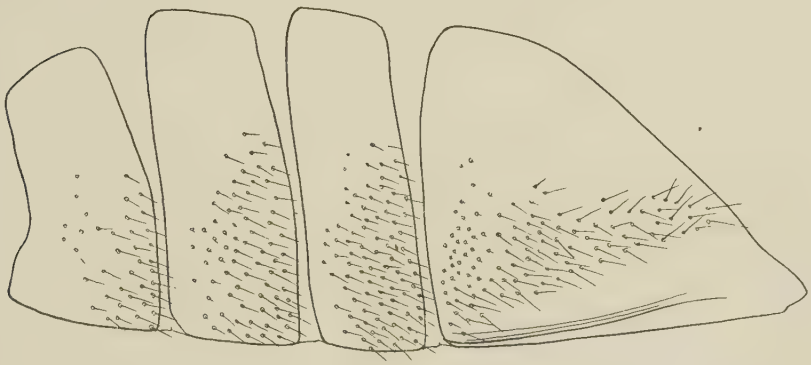


149

FIGS. 148 & 149.—*Apanteles lacteicolor* Viereck: 148, genitalia, ♀; 149, apical ventrites, ♀.

rugose or striate, or, in smaller examples, entirely smooth, medianly with a strong rugose tumescence, across the summit of which there commonly runs transversely a strong, more or less rugose carina, posteriorly to which the tergite medianly is flattened or somewhat depressed, or even strongly depressed and with the carina forming a ∩-shaped areola, the tergite apically somewhat turned over, the apical half rugose, even in the small examples, the extreme apex of the tergite depressed save for the smooth median apical lunule; 2nd tergite

rugose; 2nd suture well defined; 3rd tergite with widely separated minute punctation, otherwise and narrowly across apex and broadly across base and in a median basal area entirely smooth; succeeding tergites with the usual minute punctation; 2nd, 3rd, 4th, and 5th ventrites with median longitudinal suture throughout; hypopygium more or less membranous broadly throughout the median line, and its apex to some extent membranously acute; ovipositor sheaths equal in length to the combined length of the basal and 2nd segment of the hind tarsus, the ovipositor equal in length to the hind tarsus.

Length: 2·0–3·0 mm.

Redescribed from the following material:—British Museum: Lyle Collection, New Forest, 1 ♀, no. 1271, 3.vi.1911, 1 ♀, no. 1416, 17.v.1911, 1 ♀, no. 1906, pup. 23.iv.1912, em. 9.v.1912, Hunstanton, 3 ♂♂, no. 3533, 1.vi.1918, no. 3541, 3.vi.1918, no. 3553, 4.vi.1918, 1 ♀, no. 3600, vi.1918, Gog Magogs, 1 ♂, no. 4052, 21.ix.1919, Cambridge, 1 ♂, no. 5057, 26.vii.1926 (*G. T. Lyle*), all det. Lyle as either *viminetorum* Wesm. or ? *viminetorum* Wesm.; General Accessions: Tokyo, 2 ♂♂, ix.1931 (*T. Ishii*), det. Watanabe as *conspersae* Fiske, U.S.A., 1 ♀ (*paratype*, U.S.N.M. no. 13072), Gip. Moth Lab. 1446, U.S.A., Nashua, N.H., 24 ♀♀, 12 ♂♂, v.1929, Gip. Moth Lab. 13604–A1, Wells, Me., 1 ♀, 2 ♂♂, v.1929, Gip. Moth Lab. 13604–A4, West Newbury, Mas., 2 ♀♀, 4.vi.1911, Gip. Moth Lab. 6191, all det. Muesebeck as *lacteicolor* Vier., England, Brickhill, 1 ♀, 21.vi.1937 (*R. B. Benson*), Pinner, Middlesex, 1 ♀, vii.1923 (*O. G. Heath*), Romford, 1 ♀, 1 ♂, v.1925. Cambridge University Museum: Ditton, Cambs, 1 ♂, 1913 (*P. A. Buxton*). Manchester University Museum: Gatley, Cheshire, 1 ♂, ix.1931 (*L. Nathan*), Silverdale, Lancashire, 1 ♀, em. 11.vi.1930 (*W. P. Stocks*). Muséum National d'Histoire Naturelle, Paris: Paris, 1 ♀, v.1935, 1 ♀, 13.v.1935 (*Bourgogne*). Naturhistorisches Museum, Wien: Rhaden, 1 ♀, no. 317, 5.vii.1870 (*A. Speyer*), det. Reinhard as *viminetorum* Wesm. O. W. Richards's Collection: Slough, Bucks, 1 ♀, no. 37082, em. 29.vi.1935 (—. *Jaywickreme per O. W. Richards*). D. S. Wilkinson's Collection: England, Reading, 2 ♀♀, 3.vi.1935 (*H. L. Dolton*), Isle of Wight, Niton, 2 ♀♀, coll. mid. v.1937, em. 31.v.1937, Cambridge, Gog Magog Hills, 1 ♀, 26.viii.1937, Surrey, Dunsfold, 6 ♀♀, 4 ♂♂, coll. 14.v.1938, em. 1.vi.1938 (*R. L. E. Ford*), Essex, Upminster, 16 ♀♀, 14 ♂♂, coll. 20.v.1938, em. 10.vi.1938 (*D. S. Wilkinson & R. L. E. Ford*).

Type of *lacteicolor* in the United States National Museum; cat. no. 13072. A paratype in the British Museum.

Host. *Apanteles lacteicolor* was originally described as a parasite of the Lymantriid *Euproctis chrysorrhoea* L., and, of the material from which I have redescribed the species, Ford's two females from the Isle of Wight were bred from this host. Of the other material before me, the two males from Tokyo are labelled to have been bred from *Euproctis pseudoconspersa* Strand, and all the specimens from the U.S.A., other than the paratype of course, from *Nygmaea*, or as it is now known, *Euproctis*, *phaeorrhoea* Haw. The single male no. 5057 in Lyle's collection is recorded from the Lymantriid *Orgyia antiqua* L. Lyle's male no. 4052 is recorded from a small larva of the Notodontid *Cerura vinula* L., his female no. 1906 from the Agrotid *Hylophila*, now *Pseudoips*, *bicolorana* Fuessly, and his female no. 1416 from the Geometrid *Theria rupicapraria* Schiff. All the remainder of Lyle's material, together with the pair from Romford dated 1925, the single male from Ditton, the single female from Silverdale, the single female no. 317 from Rhaden, Dolton's two females, Ford's series from Dunsfold, and the series from Upminster, is recorded to have been bred from the Arctiid *Nola cucullatella* L., while Heath's female from Pinner was bred from a small

larva that has been determined for me by Edelsten as an Arctiid. The two females from Paris are recorded as having been bred either from the Psychid *Sterrhopteryx hirsutella* Hübn., or from "*canephora*," which latter name I cannot trace, the female from Slough from the Tineid *Carcina quercana* F., on apple, and Nathan's single male from, possibly, the Agrotid *Demas*, now *Colocasia*, *coryli* L. The material from Brickhill and the Gog Magogs was swept.

The life-history of *Apanteles lacteicolor* has not been worked out in detail for Europe, to my knowledge, and, apart from Rühl (1913, 1919, and 1922), the only reference to it in Europe known to me is that of Meier (1927), who gives merely *Euproctis chrysorrhoea* L. as a host in Russia. In Japan and Formosa, either under the name *lacteicolor* or the *nomen nudum Apanteles conspersae* Fiske, the species has been recorded by Chu (1935), Sonan (1927), and Watanabe (1932 and 1934), as a parasite of *Euproctis conspersa* Butl., now known as *E. pseudoconspersa* Strand, and of *E. flava* Bremer, now known as *E. subflava* Bremer. Following a visit by Dr. Howard to Europe the species was introduced from Europe into the United States of America in 1906, in an attempt to control *E. chrysorrhoea*; and a lengthy account of all the failures and successes of this undertaking is given by Howard & Fiske (1912), who record that the species was satisfactorily colonised in 1908, and found to be generally distributed over a considerable area in 1910 and apparently firmly established. It is an extremely important parasite of *chrysorrhoea*, and consequently it has an extensive bibliography. Shortly, its life-history in America, as shown by Burgess & Crossman (1929), Howard (1922), Muesebeck (1918), Philbrook (1915), Schaffner (1934), Summers (1916), Viereck (1916), and others, is as follows. Oviposition takes place in August in 1st and 2nd stage larvae of *chrysorrhoea*, very small larvae being preferred, even larvae that have not yet fed. Usually only one egg is laid in a caterpillar, and a single female *Apanteles* may attack upwards of 300 caterpillars. The young parasitic larva hatches in a few days, and passes the winter inside its host, which also hibernates. In May, when its host resumes feeding, the parasite likewise becomes active, and develops rapidly, killing its host in from 7 to 12 days after it began feeding, and emerging to pupate very shortly after. Adults of the first generation of *lacteicolor* are found emerging about the end of May, mating, and ovipositing in the summer hosts within 48 hours. More than one generation in the summer would seem to be necessary before larvae of *chrysorrhoea* are ready in August, and a variety of Lepidopterous larvae have been found to be acceptable to the *Apanteles* and to serve as its host. These alternative, summer, hosts are of paramount importance, and the following species in America are on record, namely, the Lymantriids *Porthetria*, now *Lymantria*, *dispar* L., notably, and *Hemerocampa leucostigma* A. & S., the Lasiocampid *Malacosoma americana* F., the Notodontids *Schizura unicornis* A. & S. and *Datana ministra* Drury, the Arctiids *Hyphantria cunea* Drury and *H. textor* Harris, and the Agrotid *Apatele hasta* Guenée. Other authors who have written on this species in America are Atwood (1922), Britton 1914, 1915, 1918a, 1918b), Britton & Caffrey (1914), Britton & Davis (1916, 1918), Britton, Davis, & Ashworth (1921), Burgess (1914, 1915, 1916, 1917, 1923), Gilliatt (1921, 1926), Howard (1913, 1914a, 1914b, 1920), Muesebeck (1920, 1922), O'Kane (1913), Philbrook (1914, 1915), Pouillaude (1913), Proper (1934), Soule (1913), Summers (1916), Tothill (1916a), Viereck (1916), and Vuillet (1912). *Apanteles lacteicolor* was introduced from the U.S.A. into Canada in 1912, against *chrysorrhoea*, and has become well established there. The species as occurring in Canada, where apparently its life-history is as in the

U.S.A., has been written on by Brittain (1923), Burgess (1916, 1924), Gilliatt (1921, 1926), Hewitt (1914, 1915, 1917a, 1917b, 1920), McLaine (1916, 1918, 1919), Sanders (1915, 1916), Tothill (1916b), and Treherne (1916).

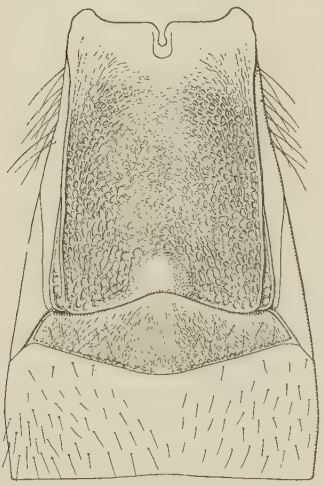
Cocoons pure white, surrounded by a small amount of loose silk. In America the cocoons of the generation that has wintered are stated to be found commonly in the webs of its host.

Commentary. Viereck originally described his *lacteicolor* from, apparently, 78 females and 54 males "bred from *E. chrysorrhoea*," with type locality Europe, and recorded that the type male and female were labelled with the U.S.N.M. Catalogue no. 13072 and the paratypes with the Gipsy Moth Laboratory Cage nos. 515, 1446, 682, 501, 238, 205, 1042, 1248, and 1295. In the British Museum is a female labelled as paratype and with the U.S.N.M. no. 13072 and the Gipsy Moth Lab. no. 1446. This specimen, which was presented by the United States National Museum to the British Museum, on exchange, is clearly to be accepted as a paratype. It agrees perfectly and in the minutest detail with all the other material before me from which I have redescribed the species.

Apanteles anarsiae F. & A.

Apanteles xanthostigmus Haliday, var. *anarsiae* Faure & Alabouvette, 1924, *Rev. Zool. agr. et app.* **23** : 283.
Apanteles anarsiae Faure & Alabouvette, Wilkinson, 1931, *Bull. ent. Res.* **22** : 79.

♀. Black; front femora except at base, middle femora apically, the front tibiae, the four anterior tarsi, and to some extent the hind tibiae at extreme base, red testaceous;



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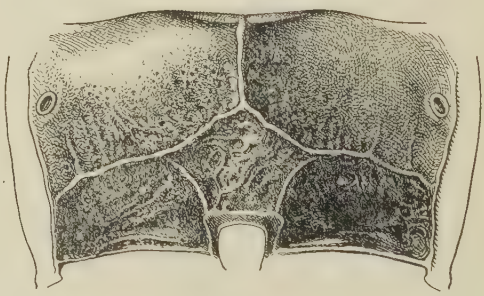

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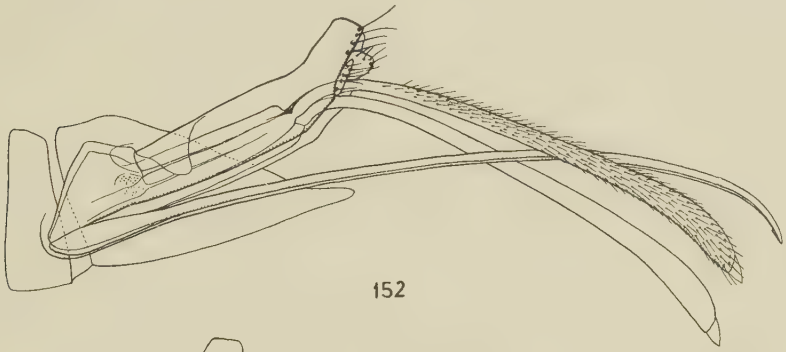
Figs. 150 & 151.—*Apanteles anarsiae* F. & A.: 150, basal tergites, ♀; 151, propodeon, ♀.

middle tibiae commonly red testaceous, as often, however, slightly darkened in the apical half or two-thirds, again as often strongly darkened in the apical half or two-thirds; palpi and tibial spurs pale; wings just faintly infumated and the setae to some extent coloured, at least not describable as white hyaline; costal veins testaceous, a narrow border round the stigma more or less testaceous or slightly darker, the metacarp darker again; wing-

veins in at least the basal half of the wing colourless; discally the stigma is hyaline or but faintly pigmented.

♂. Black; front femora apically, front tibiae and tarsi, extreme apex of middle femora, middle tibiae basally, middle tarsi, red testaceous; palpi and tibial spurs pale; wings white hyaline, but otherwise as in the female.

♀♂. *Head*: face and clypeus with regularly and rather closely placed, minute punctation (degree 1) throughout; facial depressions nearer to apex of clypeus than to the eyes; frons and vertex with closely placed punctation (degree 2 or 3) throughout, which often appears to be pruinose; posterior ocelli about equidistant from each other and from the eyes; occiput pruinose; flagellum of female equal to the combined length of thorax and abdomen, of



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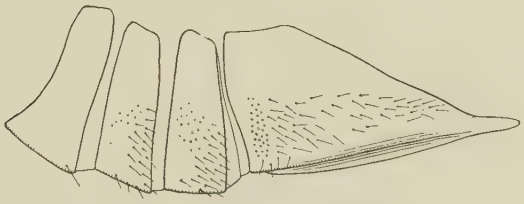

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FIGS. 152 & 153.—*Apanteles anarsiae* F. & A.: 152, genitalia, ♀; 153, apical ventrites, ♀.

male considerably longer than combined length of head, thorax, and abdomen (4 : 3). *Thorax*: mesonotum throughout with very closely placed punctation (degrees 3 and 4); scutellar sulcus slightly rounded, with about sixteen crenulations; disc of scutellum punctate throughout but with the punctation sparser and weaker than on the mesonotum, very flat and on the same plane as the posterior half of the mesonotum; the non-excavate area of the lateral faces of the scutellum quite large but not reaching up beyond half-way towards base of scutellum; propodeon of female *figured* (fig. 151); the areola of the propodeon, which is invariably closed basally, the costulae, and the median longitudinal carina joining the areola to the base of the propodeon, always present, more usually very strongly marked, but the strength of the carination, the strength and extent of the rugosities in the neighbourhood of this carination, and even the shape of the areola, variable; apparently it is particularly in the smaller specimens that the rugosities are much weaker (or even absent) and that the areola is not so flattened (as it is in the figure) but reaches up nearer to the base of the propodeon so that the basal median longitudinal carina is relatively much shorter; that is to say, therefore, as a general rule the areola of the males is shaped differently from that of the females; but this is not so always, since many small specimens not only have rugosity in the neighbourhood of the carination but also exhibit the more flattened areola

(as figured) that would seem to be more usually (but not always) attributable to the female. *Legs*: hind coxae on outer faces throughout punctate (degree 1–2), basally above rather more strongly and closely than on the outer faces; the longer hind tibial spur half, and the shorter spur a little less than half, the length of the basal joint of the hind tarsus. *Abdomen* (figs. 150, 152 and 153): 1st tergite of female in the basal third slightly excavated and, particularly along the sides, to some extent striated, at the apex of the basal third weakly tumescent, the apical two-thirds weakly turned over and more or less flat and finely rugose or, particularly towards apex, with fine longitudinal rugose striation, of the male more or less evenly weakly arched throughout, in the basal fourth finely striate, in the apical three-fourths finely rugose or, particularly towards apex, with obscure, fine, longitudinal striation; 2nd tergite of female finely rugose, of male finely rugose to obsoletely rugose; 3rd and succeeding tergites minutely punctate; all ventrites of ♀ with a median longitudinal suture; ovipositor sheaths elongate, longer than the hind tarsus, strongly decurved at apex as is also the ovipositor itself; hypopygium membranously acute.

Length: 2·5–3·0 mm.

Redescribed from the following material:—British Museum: France, Frejus (Var), 1 ♂, 28.v.1930, 1 ♂, 30.v.1930, 1 ♀, 5.vi.1930, 1 ♀, 6.vi.1930, 1 ♀, 1 ♂, 7.vi.1930, 1 ♀, 27.vi.1930, 1 ♂, 1.vii.1930, Alpes Maritimes, 1 ♂, vii.1930, Auribeau (A.M.), 1 ♀, 15.viii.1930, 1 ♂, without emergence date, Cagnes-sur-Mer (A.M.), 1 ♀, 6.vi.1930, collectors not named; Station Entomologique du Sud-Est, 1 ♀, 29.vi.1924; Alpes Maritimes, 1 ♀, no. 558, 28.viii.1931 (*Rippas*), Bellet (A.M.), 1 ♂, no. 472–30, 1.viii.1931 (*Rippas*), Lingostières (A.M.), 1 ♀, no. 472–9, 4.vi.1930, 1 ♀, no. 472–28, 26.vi.1930 (*Rippas*), Mandelieu, 1 ♂, no. 472–17, 21.vi.1930 (*Rippas*), St. Isidore (A.M.), 1 ♂, no. 472–26, 7.vi.1930 (*Rippas*). Dr. Ferrière's Collection: Station Entomologique du Sud-Est, 1 ♂, 9.vi.1924. Imperial Institute of Entomology, Farnham House: Alpes Maritimes, St. Isidore, 1 ♀, no. 472–10, 7.vi.1930, 1 ♂, no. 472–20, 25.vi.1930, St. Martin du Var, 1 ♂, no. 474–2, 1 ♀, no. 472–12, 21.v.1930, Bellet, 1 ♀, no. 472–31, 18.vii.1931, Castagniers, 1 ♀, no. 472–14, 26.v.1930, Cros de Cagnes, 1 ♀, no. 472–27, 7.vii.1930, Lingostières (A.M.), 1 ♀, no. 472–8, Mandelieu, 1 ♀, no. 472–18, 21.vi.1930, Vallée du Var, 1 ♂, no. 472–13, 23.vi.1930 (*Rippas*). Laboratorio di Entomologia, R. Istituto Superiore Agrario, Bologna: Bologna, 1 ♀, 20.v.1929, 1 ♀, 21.v.1929, 1 ♂, 14.vii.1929, 3 ♀♀, 16.vii.1929.

Type presumably either in Faure's or in Alabouvette's Collection; female cotype in the British Museum, male cotype in Dr. Ferrière's Collection (but see Commentary).

Host. This species was originally described as a parasite of the Tineid, *Anarsia lineatella* Zell., in France, and from this host was bred all the above material from which I have made my redescription, with the exception of the following three specimens, namely the female no. 558, the male no. 474–2, and the female from Auribeau, which are labelled to have been bred from the Tortricid, *Cydia* (*Laspeyresia*) *molesta* Busck. The female no. 472–18 is labelled to have been bred from either one or the other of these two hosts.

Faure & Alabouvette state that, in 1924 and in the region of South France in which they were working, this *Apanteles* killed 17 per cent. of the larvae of the 1st generation of *Anarsia lineatella*.

Allen (1932) and Marlatt (1931) record that this *Apanteles* has been imported into the United States, while Sarra (1915), when writing on *xanthostigmus* Hal., which he also records as a parasite of *A. lineatella* in, presumably, Italy, almost certainly had *anarsiae* F. & A., before him and not Haliday's species: but I

have not seen any material from these three authors and consequently must accept their statements with reserve.

Cocoons white, of very thin texture and more or less transparent.

Commentary. Faure & Alabouvette originally described this species from both the female and the male, but from an unstated number of individuals. The paper in which the species was described was " effectué à la Station Entomologique du Sud-Est," and the two specimens thus labelled that I have seen, namely the single male in Dr. Ferrière's collection, and the female, also dated June 1924, which is now in the British Museum but which also was once in Dr. Ferrière's collection, are virtually cotypes, since, as I pointed out in 1931, Faure, before the publication of his paper with the new variety *anarsiae*, sent these two specimens to Ferrière for his remarks. Dr. Ferrière tells me he replied to the effect that these specimens were " close to *xanthostigmus*," and since Faure in his paper acknowledges Ferrière's assistance, the logical sequence is complete. Should there, however, remain any doubt as to my correct determination, I would also draw the student's attention to Faure & Alabouvette's figure (his fig. 28) which so admirably portrays the facies of this *Apanteles*, as I understand it, and which in conjunction with the host record would of itself almost be sufficient to establish the identity of my material.

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